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INTERNATIONAL CONGRESSES.

By Prof. Joseph P. Remington, Philadelphia.

A great deal of misconception evidently exists in the minds of many upon the objects and aims of international congresses of various kinds.

This is not only the case in relation to pharmaceutical conferences, but medical and professional international gatherings of all kinds. The absence of a universal language must always continue to be the principal bar to effective intercourse between representatives of mixed nationalities, and the larger the attendance at a congress the greater becomes the babel of tongues, with its necessary confusion. The International Medical Congress at Moscow had an immense attendance, a very large number of papers were read of unequal value and although the Russian Government provided most liberally for the entertainment of the delegates, it was found impossible to send invitations to each member for every official function. This necessarily produced heart burnings which even Russian diplomacy could not entirely soothe.

The International Pharmaceutical Congress, which met at Brussels, has been criticised by a German editor in America, who found fault with it, for "from the beginning to the end not a German word was heard in the deliberations of the Congress," and "because the subjects on the programme were principally of interest to Belgium, and almost exclusively presented from the Belgium standpoint," and the writer consequently argues "that it could not be international

in character." Thus we have two contrasts presented. One congress was too international and suffered from unwieldiness, and the confusion incident upon the attendance of too many foreigners, and the other could not be international because no German voice was heard in its deliberations, and too much local flavoring was injected into its composition.

It will always be a question for many generations to come, whether the world would be likely to flourish better under one supreme mundane ruler or a number of rulers governing as many separate nations. The German nation itself is wrestling with this problem, and many of its best citizens are asking: "Are we better off to-day under the Empire than we were before consolidation was effected?" and this condition exists notwithstanding the fact that the same language is spoken by all. Is it strange, then, that an international gathering largely attended by men of one profession like the one at Moscow should be criticised by some of its own members, who have been heard to say: "I have derived more benefit from my own County Medical Society than from the deliberations of the great Congress which I have travelled 7,000 miles to attend?" The truth is, that international congresses must not be judged from a local standpoint. The ideal congress, either pharmaceutical or medical, would probably be one in which all civilized nations were equally represented and equal prominence given to each, papers read and discussed only by the most distinguished representatives from each nation, and each one bristling with original observations or newly discovered facts, while the decision of the congress upon general questions should be such as would deal fairly and justly with every nation, and accepted as final by the subordinate bodies in each country. Finally, every member should return home, perfectly satisfied that he had received every attention due him as the representative of his nation, and the action which he especially desired the congress to take was adopted, and what he did not want adopted was rejected. No one can ever hope to see such an ideal realized.

Unfortunately, those who desire to accomplish any good, no matter how high their ideal may be, must be prepared to accept the conditions *which exist*, and strive earnestly to bring about the ideal. If a congress is not international the cause should be sought for and removed if possible. In professional gatherings, political differences should be ignored; "Science knows no language and no country."

The earnest seeker for truth is rewarded by making a discovery which will rescue many a valuable life or alleviate suffering wherever it exists; a liberal profession should embrace in its membership those who are willing to labor for the benefit of all, and until such a motive actuates the members of the pharmaceutical profession throughout the world, and unless the true international feeling is cultivated, the ideal can never be approached. If rejoicing is in order and congratulations tendered, because the representatives of a great nation *decline the invitation to attend a congress*, then is the first principle sacrificed. Some one spot in the world must always be selected as the place of meeting, and long distances travelled by some delegates, of course, loyalty to the international spirit should overcome personal feeling, and if members have grievances, nothing can be gained by staying away from the meeting; there is really more necessity for activity and personal interest. It is deplorable that international pharmacy, standing as it does to-day, more in need than any other profession, of united effort, seems to possess a greater proportion of iconoclasts and pessimists than any other; this is especially the case in America; if an organization for mutual benefit is started, more hands seem to be at once raised to tear it to pieces, than to build it up. Will it be thus always?

International congresses, in the writer's opinion, serve a most valuable purpose in bringing together pharmacists of different nations; notwithstanding the difficulties of interchanging thought fluently, it is worth something to realize that progress in education, in scientific research and social advancement is constantly going forward, and if abuses and obstacles are found in one's own country, it is some consolation to hear (even in a foreign tongue), that efforts are made to reform the abuses and to overcome the obstacles, and "the fellow-feeling that makes one wondrous kind" is kindled. In all international and national gatherings, whether professional or otherwise, the social features are claiming more attention and recognition. It is true that there are many scientists who stand aloof from social entertainment of all kinds, others rail at them in public and private, but nevertheless are seen always at these entertainments. It may be assumed, however, that without social functions, congresses would be very poorly attended. The pharmacist, overworked, confined during the day and often a large part of the night within the walls of his dingy shop or laboratory, looks forward to a

vacation in the heated term for a relief; if he can combine mental and physical recreation by associating with his fellows and kindred spirits, and thus gaining by social intercourse and rational pursuits the much needed rest, he has enlarged his horoscope and becomes much better qualified to deal with the perplexing problems which threaten his existence, and has taken the preliminary steps toward that organization and united effort which will make him a power in the community, instead of a disorganized mass of disjointed entities.

Eight International Pharmaceutical Congresses have come and gone, and while it can be truly said that not one has reached the ideal, it must be remembered that great difficulties have stood in the way. Some of these have already been noted. Such gatherings suffer greatly from the impossibility of organizing them completely until the first day of the meeting, for it can never be told in advance with certainty how many foreign delegates can be present. Necessary delays in travel and many other contingencies prevent the local committees from arranging satisfactory programmes for each day. There is a difficulty of finding, even in a large city, competent interpreters who have a knowledge of the technical subjects discussed; then again, no one person has ever been found who has a complete knowledge of the abilities and capacities of each delegate, and hence it must follow that committees are not always appointed which embrace the best available material; in short, all of the responsible organizing authorities are reduced to the necessity of selecting those whom they know and whom they believe to possess the necessary qualifications. Hence it will always be found that each pharmaceutical congress must suffer from what is called "local flavoring." In conclusion, the writer does not share in the belief that international gatherings should be discontinued. The faults are capable, in a large measure, of being corrected or minimized when they are fully recognized, and greater experience will lead to their elimination, but one valuable consideration stands out prominently which overshadows the minor faults. Pharmacy is recognized officially by European Governments as a profession, and, as in the case of pharmacy laws which are admittedly imperfect, it must be said that the steady advancement in the recognition by the people of the important relations which the pharmacist sustains toward them is one of the greatest value. Is it not possible we have had too much criticism of the detail in judging such gatherings, and too little real appreciation accorded to the greater results accomplished?

THE DESTRUCTION OF TOBACCO IN VIRGINIA BY ACT OF GENERAL ASSEMBLY, JANUARY 6, 1639, UNDER SIR FRANCIS WYATT, GOVERNOR.[1]

BY JOHN URI LLOYD, PH.M., PH.D.

Query by Professor Flückiger.—" In Alonzo Calkins (Opium and the Opium Appetite), Philadelphia, 1871, p. 373, there is a statement to the effect that in 1639, by authority of the 'Virginia Assembly' there went out a decree that all the tobacco then standing in cultivated fields should be dug up and exterminated. Is this correctly abstracted from some official records?"

Answer by John Uri Lloyd.—In reply to this question, I am convinced that the evidence is conclusive that only *part* of the tobacco was destroyed. This was because tobacco was too abundant to command a good price in the market, and *not* with a view to its extermination. By destroying a large share of the crop the remainder was enhanced in value. In support of my view, I offer testimony which seems to me conclusive.

The subject may be traced as follows:

G. Bancroft makes only general allusion to the laws restricting the planting of tobacco in Virginia at that time.

Robert R. Howison, A History of Virginia, 2 Vols., and

Henry Howe, Historical Collection of Virginia, 1856, both point to:

Hening, Statutes at Large, 1st Vol., pp. 224 and 225, as a book of reference on the records of Virginia administration. In this publication, *1st Vol., pp. 224 and 225*, we find the following Acts by the Grand Assembly of Virginia, January 6, 1639, under Sir Francis Wyatt, Governor:

ACT I.

" Tobacco, by reason of excessive quantities being made, being so low that the planters could not subsist by it, or be enabled to raise more staple commodities, or pay their debts:

[1] When Professor Flückiger visited America (July, 1894) he hoped to obtain historical data that would enable him to give the records of several interesting American productions. In this he failed, and he then associated in his behalf the services of the author of this paper. After much of the work had been done, the death of Professor Flückiger interrupted the investigation. This paper on tobacco was one of the subjects considered.—EDITOR AM. JOUR. PHARM.

"*Enacted*, that the tobacco of that year be viewed by sworn viewers, and the rotten and unmerchantable and *half the good* to be burned."

"So the whole quantity made would come to 1,500,000 pounds without stripping and smoothing, and the next two years 170 pounds tobacco per poll, stripped and smoothed, was to be made, which would make, on the whole, about 1,300,000 pounds, and all creditors were to take 40 pounds for 100."

ACT II.

"No man should be obliged to perform above half his covenants about freighting tobacco in 1639."

Adjoined to the copy of these Acts we find the following, added by Hening, to show his authority:

"These acts are printed from a MS. which belonged to Thomas Jefferson, President of the United States, and which is now in the *Library of Congress at Washington.*

"This MS. volume is lettered '*Writings Related to Virginia*,' and contains most of the old charters, instructions to the governors, etc. At the end of the volume is an abstract of public papers, taken from the rolls, the number and page of which are referred to, but without regard to chronological order. The Acts of 1639 appear to be a mere *abridgement*, and, from the handwriting and orthography, it seems to have been made long posterior to their date.

"This abstract concludes with a list of the governors of Virginia down to the year 1722, at which time, or shortly afterwards, it was probably compiled.

"The handwriting, on comparison, appears to be that of 'R. Hickmann,' by whom, as 'clerk of the secretary's office,' several public papers are attested."

In connection with the foregoing, as an evidence that "history repeats itself," we find that the president of the Cotton Growers' Association has recently (1897) advocated the destruction of part of the cotton crop of the South, in order to increase the price of that which remains. A paper headed "Signs of the Times," in the *Nation*, March 4, 1897, prints the following, thus showing that the method adopted 250 years ago has met the theorist of to-day:

"*Signs of the Times.*—The Southern farmers are again showing that it is not the principle of combination to which they are opposed, but the use of that principle by any other class of people than farmers

—except 'organized labor.' They denounce bitterly any union on the part of those who buy their cotton to raise the price of products manufactured from it, but they earnestly advocate the adoption of measures to make the manufacturers pay higher prices for the staple. The president of the Cotton Growers' Association has issued an address calling conventions of the Texas farmers at Waco, Texas, March 8th; of those in the Mississippi Valley at Memphis, March 10th, and of those east of the Mississippi at Augusta, March 15th, to secure 'concert of action,' as 'by a systematic and judicious marketing of our crops we can realize inestimable benefits that never can be secured permanently otherwise.' The method urged upon the cotton growers is that which is so bitterly complained of when applied to the cotton manufacturers—a restriction of the output in order to secure higher prices. 'Destroy the annual surplus of cotton' is the watchword. 'You will be better off with a 7,000,000-bale crop selling at 10 cents, supplemented by ample food crops, than with a 10,000,000-bale crop selling at 5 cents.'"

AN EXAMINATION OF SOME OFFICIAL LEAD PREPARATIONS.

By Frederick W. Haussmann.
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The observation that certain official preparations prepared from lead salts differed from the standard prescribed by the Pharmacopœia, induced the writer to inquire into the cause of such variations.

Continued investigations revealed the fact that the statements of the Pharmacopœia, regarding the preparations under examination, were also open to criticism, and in the course of this paper, alterations and additions which may be regarded necessary will be mentioned.

The experience of other pharmacists is invited to be rendered for comparison either to corroborate or disprove the conclusions arrived at by the writer.

The original researches were confined to Goulard's extract, the liquor plumbi subacetatis of the Pharmacopœia, where the first deviations from the official standard were noticed. It was soon found, however, that, to determine the exact causes thereof, it was also necessary to examine the metallic ingredients, lead acetate and oxide.

LIQUOR PLUMBI SUBACETATIS.

If it were possible to realize the idea of an international Pharmacopœia, this preparation deserves attention among the first to secure uniformity in method of preparation as well as in the proportion of basic salt.

It is unnecessary to point out the respective variations in different pharmacopœias, and only sufficient to call attention to varying degrees of specific gravity, volumetric strength and method of preparation.

Even in the Pharmacopœia of the United States the two last revisions have been productive of deviation in strength from the previous editions.

The subject of Goulard's extract may be treated under the following heads, viz.: preparation, specific gravity and volumetric strength.

PREPARATION.

The following are the full pharmacopœial directions:

	Grammes.
Lead acetate	170
Lead oxide	100
Distilled water to make	1,000

Dissolve the lead acetate in 800 grammes of boiling distilled water, in a glass or porcelain vessel. Then add the lead oxide, previously passed through a fine sieve, and boil for half an hour, occasionally adding hot distilled water to make up the loss by evaporation. Remove the heat, allow the liquid to cool and add enough distilled water, previously boiled and cooled, to make the product weigh 1,000 grammes.

Finally filter the liquid in a closely covered funnel.

In these directions the amount of insoluble basic lead subacetate is included in the final weight, and the solution is directed to be filtered therefrom.

The filtrate weighs, according to the National Dispensatory, approximately 950 grammes.

An inquiry among a number of pharmacists revealed that the pharmacopœial directions are interpreted by several to read to make the *filtrate* weigh 1,000 grammes. This would result in a preparation approximately 5 per cent. weaker in strength.

The basis for this opinion is furnished by the official direction of boiling the oxide in 800 grammes of distilled water, in which the

acetate has previously been dissolved, and *making up* the loss by evaporation by the occasional addition of hot distilled water.

The exact observation of the original volume in this manner, it is claimed, would necessarily produce an aggregate weight of 1,070 grammes. To substantiate this claim, the specific gravity of the solution thus prepared is advanced, which closely approximates that stated by the Pharmacopœia.

Determinations by the writer in instances where cold maceration was employed, with the stated increase in the amount of the water, again where the pharmacopœial method of preparation under like conditions was followed, and finally in another process, to be described subsequently, it was found that the specific gravity remained within pharmacopœial bounds, although a less quantity of $\frac{n}{1}$ sulphuric acid was required for the complete precipitation of 13·67 grammes of the solution.

Goulard's extract may also be prepared by cold maceration, viz.: by introducing the lead salts in a bottle with the water, with occasional agitation, until the yellow color of the oxide is changed to white.

This is the process of the Austrian Pharmacopœia, and two to three days are stated to be required for completion. Positive assertion is made that with the disappearance of the yellow color of the oxide no more enters into solution. The chief objection to this method is the time it requires.

While preparing the solution by cold maceration, it occurred to the writer to try if the substitution of hot or even boiling for the cold water would accelerate the solution of the oxide.

This was determined to be the case, and it was found possible to prepare Goulard's extract in a comparatively short time, avoiding the troublesome boiling and the difficulty experienced in the preservation of a definite volume.

The following are the directions:

A strong bottle—a fruit juice bottle holding a full quart will answer—is graduated to 730 c.c.

Distilled water is heated to boiling and poured into the bottle up to the graduation mark.

170 grammes of selected *crystallized* lead acetate, previously broken into small pieces, are now quickly added and the bottle corked.

A few turns of the vessel will dissolve the salt.

100 grammes of lead oxide, previously sifted, are now added in divided portions, thoroughly shaking the bottle after each addition.

In from five to ten minutes, on repeated thorough agitation, the yellow color of the oxide will have changed to white.

The mixture is allowed to stand two hours or until cold, with occasional agitation, and filtered, with observation of the usual precautions.

The solution thus prepared will fulfil the requirements of the Pharmacopœia in all particulars.

The only precautions necessary are the observation of the liability of fracture of the bottle, unless the same is previously warmed, and the protection of the hands with gloves or a towel to prevent burning.

The oxide must be added in divided portions, as the full addition is liable to be followed by caking, with consequent less rapid solution.

The question may be raised—will this comparatively brief contact of the lead salts suffice to complete the solution, or, by further prolonged maceration, will more of the oxide be not taken up?

To determine this point, the following trial was made: The process described was employed, preparing 1,000 grammes of the solution.

After a contact of exactly two hours 100 c.c. of the solution were filtered off and marked filtrate No. 1.

The remainder of the solution was allowed to stand twenty-four hours longer, with occasional agitation.

An additional 100 c.c. were again filtered and marked No. 2.

The remaining portion was allowed to stand forty-eight hours more, and a third portion of 100 c.c., marked No. 3, filtered off.

The final remaining mixture was allowed to stand eight days, with occasional agitation, making the total time of maceration from the time of preparation about twelve days, and filtered.

The solutions were each examined in turn as to specific gravity and percentage of basic salt, according to pharmacopœial directions.

The respective specific gravities were all found to be identical, and the estimation with normal sulphuric acid gave little variation, in no case being more than a fraction of a cubic centimetre, and none

were found to require less than 25 c.c. for precipitation of 13·67 grammes of the solution.

Similar experiments were repeatedly performed, and it was invariably found that after a contact of two hours, little or no oxide passes into solution.

In one instance, the mixture of lead, salts and water was allowed to stand three weeks before filtration, but no difference was found between this and a filtrate of two hours' standing.

Various modifications of this process, such as trituration of the mixed lead salts in a mortar and subsequently adding boiling distilled water, were also tried, but furnished no improvement over the method described.

OTHER METHODS OF PREPARATION.

Acetates of the alkaline earth metals also possess the power of dissolving lead oxide.

Of these, magnesium acetate has been suggested to prepare a modification of Goulard's extract, and particularly lead water.

This process, as given in the Proceedings of the American Pharmaceutical Association of 1893, possesses no advantage. It is tedious and does not furnish an official preparation.

Of greater importance is a process which is based on the fact that if ammonia water is added to a solution of lead acetate in the proper proportion, a solution of the basic salt is immediately produced.

The following is the process recommended:

Seventy-five parts of pure crystallized lead acetate are dissolved in 165 parts of distilled water and 11 parts of water of ammonia, 20° B., sp. gr. 0·923, are added.

In place of the ammonia water of this strength, 22 parts of the official 10 per cent. water can be added, deducting 11 parts from the amount of water employed to dissolve the acetate. The preparation is stated to be immediately ready for use.

Goulard's extract, thus prepared, resembles the official preparation in appearance, has no odor of ammonia, but in point of stability possesses no advantage, also depositing lead carbonate on prolonged standing.

The specific gravity of the solution was found to be 1·208.

In the volumetric estimation of Goulard's extract, prepared by

the ammonia process, several conditions were noted, which, when disregarded, are liable to lead to error.

Titrated with $\frac{n}{1}$ sulphuric acid, using methyl-orange as indicator, it was found that nearly 30 c.c. were required before the orange color was changed to crimson, while in precipitation without the indicator, only 22 to 23 c.c. were required for 13·67 grammes of the solution.

Both estimations were found erroneous, the ammonia probably influencing the reaction with the indicator, while in the simple acid estimation the fact must be considered that ammonium acetate, which necessarily is present in the preparation, has the property of dissolving lead sulphate.

If the lead is completely precipitated by means of sulphuric acid, the sulphate removed by filtration and the filtrate examined, the presence of the metal is revealed by every reagent, excepting sulphuric acid.

To accurately estimate an ammonia-prepared Goulard's extract by means of volumetric analysis, it is therefore necessary to employ a different precipitant.

Volumetric $\frac{n}{1}$-oxalic acid solution was substituted for sulphuric acid, and it was found that 13·67 grammes of the preparation required 23 to 24 c.c. for complete precipitation.

COMMERCIAL GOULARD'S EXTRACT.

A number of specimens of Goulard's extract, procured from various sources, were also examined as to their specific gravity and volumetric strength.

In appearance, considerable difference was noticed, some being clear and perfectly colorless, while one sample was of a decidedly yellowish-brown color.

All degrees of intensity in precipitation of lead carbonate were also observed.

The liability of the preparation to deposit the carbonate on standing must be considered when comparing commercial samples with the pharmacopœial standard.

This takes place even when every precaution is employed to prevent the access of air.

As a necessary consequence, decrease both in specific gravity and volumetric strength will result.

This was noticed by Prof. J. U. Lloyd in a paper published in the AMERICAN JOURNAL OF PHARMACY, and in a number of observations the writer can only record a similar experience.

SPECIFIC GRAVITY OF GOULARD'S EXTRACT.

The specific gravity of commercial Goulard's extract varies widely.

One sample, which was stated to be of recent preparation, had a specific gravity of 1·270, and 13·67 grammes required between 29 and 30 c.c. of $\frac{n}{1}$ sulphuric acid for precipitation.

This specimen was evidently prepared according to the Pharmacopœia of 1870.

On the other hand, one solution was found of the specific gravity of 1·128, which required only 15 c.c. of the normal acid for the precipitation of 13·67 grammes.

This preparation was cloudy, and bore evidence of careless preservation.

The present Pharmacopœia states the specific gravity to be *about* 1·195, while the edition of 1880 requests the same to be 1·228.

The latter employs a larger quantity of lead oxide, but both are unanimous in the amount of basic salt, each demanding 25 per cent.

A number of determinations have led the writer to the conclusion that the specific gravity point of the present Pharmacopœia is placed too low.

This was first suggested while examining a commercial specimen, which possessed the specific gravity of 1·1875, but only required 20 c.c. of normal sulphuric acid for precipitation of 13 67 grammes.

Several samples, with specific gravities closely approximating the official figure, were invariably found to require less than 25 c.c. of the normal acid for precipitation.

It was also found that considerable variation in specific gravity took place if lead acetate was employed obtained from different sources.

It was, in fact, found impossible to purchase this salt in the mar-

ket, to employ it with any degree of confidence for the accurate determination of the specific gravity of Goulard's extract.

The results of the writer, pertaining to the quality of commercial lead acetate, will be treated of subsequently.

At the suggestion of Prof. H. Trimble, the writer prepared lead acetate from a sample of litharge, which assayed 99 per cent. of lead oxide, crystallizing the salt from a slightly acid solution.

The air-dried salt was obtained in silky masses, considerably more bulky than the commercial salt.

Goulard's extract was prepared from this salt.

For the accurate determination of the specific gravity maceration was first employed, each step in the process being carefully checked and every precaution observed.

About 1 litre of distilled water was heated to boiling, and, while hot, poured into a previously sterilized bottle and allowed to cool.

730 c.c. of the water were measured out and, to determine the exact quantity, weighed.

To further prove, the amount was calculated to troy weight, and compared.

170 grammes of the acetate were dissolved in the water, and to this solution 100 grammes of the 99 per cent. lead oxide were added in divided portions.

The mixture was allowed to stand in a well-closed bottle for five days, agitating repeatedly, at the expiration of which time the mixture was again weighed and no loss noticed.

It was then filtered with the usual precautions.

The specific gravity of the finished solution was found to be 1·230, and 13·67 grammes required between 25 and 26 c.c. of $\frac{n}{1}$ H_2SO_4 for complete precipitation, using methyl-orange as indicator.

To verify the above result the solution was prepared by the pharmacopœial process, with scrupulous observation of all details, employing the same salts as in the foregoing operation.

The specific gravity of this solution was 1·229, and 13·67 grammes also required between 25 and 26 c.c. of the normal acid for precipitation, thus obtaining almost identical results.

Various similar experiments were also made with acetates and oxides of lower percentage than employed in the foregoing. The results thus obtained were deemed of importance, as the lead acetate

of commerce is usually prepared from litharge more or less impure, and this may influence the specific gravity of lead subacetate solution prepared from such salts.

For instance, the solution was made from an acetate which the writer prepared from a sample of litharge assaying 96 5 per cent. of oxide, the latter being also employed.

The finished preparation had the specific gravity of 1·225, and required exactly 25 c.c. of normal sulphuric acid for the precipitation of 13·67 grammes.

The specific gravity of lead subacetate solution will not answer either for an identity test or a criterion as to percentage strength.

An aqueous solution of lead acetate containing between 25 and 28 per cent. of the salt will have a specific gravity closely approximating 1·195, the official figure for Goulard's extract.

A 17 per cent. solution of lead acetate was found to have the specific gravity of 1·123, and 13·67 grammes required for precipitation about 14 c.c. of $\frac{n}{1}$ H_2SO_4.

An addition of 100 grammes of lead oxide to 1,000 grammes of this solution, allowed to stand one week with occasional agitation, yielded a filtrate of the specific gravity 1·207, which, however, only required 23 c.c. $\frac{n}{1}$ H_2SO_4 for precipitating the usual amount.

It will be seen that although the specific gravity of this solution is in excess of the pharmacopœial figure, it fell short in the percentage of basic salt, while having a 10 per cent. increase in water over the official amount.

From the above and other results obtained, the writer draws the conclusion that the specific gravity of liquor plumbi subacetatis must be placed as *about* 1·225, instead of 1·195, the pharmacopœial figure.

LIQUOR PLUMBI SUBACETATIS DILUTUS.

The official lead water is one of the preparations for which, due to its liability to chemical change, it is alike impossible to suggest improvement or to fix a definite standard.

When recently prepared, a clear solution is obtained. But aside from the procedure of many pharmacists to draw their distilled water

for this preparation from the water spigot, it still remains that the solution cannot be kept long in a cloudless condition.

Many prefer to dispense a cloudy solution, to lessen the liability of error in connection with lime water.

In the Aqua plumbi Goulardi, a spiritous form of lead water of several continental pharmacopœias, ordinary soft water is directed.

An important feature is thereby lost sight of, namely the impairment of the efficacy of the preparation as a local application, the insoluble lead sulphate and carbonate not possessing an equal value.

For the Pharmacopœia to direct recent preparation is also impracticable and would be disregarded.

The writer attempted to estimate the percentage of basic lead subacetate in samples of lead water procured from the shops, but, due to the constantly decreasing strength of the official preparation, found it impracticable to fix a definite standard.

It was found, however, that commercial lead water presents even greater variations in strength than Goulard's extract.

In view of the liability of confounding the solution with liquor calcis, it is perhaps not out of place to call attention to the direction of the French codex to add a small quantity of vulnerary spirit, an alcoholic solution of the oils of lavender, sage and rosemary.

In connection with the official lead solutions, the writer would finally call attention to a preparation recently published in Dieterich's Manual, namely, a dried lead subacetate, plumbum aceticum siccum. As the quantities of the ingredients are based upon the German Pharmacopœia, it is unnecessary to reproduce them here.

From this dried salt, both Goulard's extract and lead water may be made extemporaneously, and as its preparation presents no difficulty to the practical pharmacist, a similar compound, based on U.S.P. quantities can easily be furnished.

The salt would solve a problem which, as long as the solutions are official, will always confront the pharmacist, namely, rapid and recent preparation.

THE LEAD ACETATE OF COMMERCE.

By far the greatest importance, and of paramount influence upon Goulard's extract and similar preparations, is found in the quality of the lead salts.

First attention is claimed by the acetate.

Every pharmacist has undoubtedly observed the physical and chemical variations in commercial sugar of lead. In the price lists of wholesale drug firms we find quoted several varieties, among which we find the white and brown. That the latter has been used in making Goulard's extract in some instances was revealed by the examination of commercial samples.

But not only careless selection of the salt, but the inherent physical properties, as well as the liability of chemical change, have a material influence, and may either increase or diminish the strength of the preparations made therefrom.

Treating first of the liability of increase, we find that lead acetate contains 14·25 per cent. of water of crystallization.

The Pharmacopœia states that this is lost at a temperature of 40°C., and Ladenburg states that the salt loses its water of crystallization in dry air.

As in our climate the summer temperature falls but a few degrees short of the above figure, the liability of the loss of water must be borne in mind.

This will result in an *increase* in the lead strength of a salt thus exposed, and is, in not a few instances, in consequence, the result of keeping the salt in packages in place of well-closed vessels.

To substantiate this point, the writer made the following observation:

Goulard's extract was prepared from a specimen of lead acetate obtained from a reputable manufacturer and labelled C.P., U.S.P., put up in paper cartoons.

The solution had the specific gravity of 1·253, and 13·67 grammes required 27 c.c. $\frac{n}{1}$ H_2SO_4 for precipitation.

But the prolonged exposure of the salt to air is, on the other hand, liable to cause a *decrease* in the lead strength.

Lead acetate absorbs CO_2 from the atmosphere, giving the salt a white crust of carbonate.

Prolonged exposure results in partial conversion into lead carbonate, and as the latter is insoluble in water, a deficiency in the lead strength of the salt takes place.

This is probably the cause of the diminished strength of commercial Goulard's extract, and is the result of the not unusual procedure of using the effloresced, unsalable scraps and refuse of packages in the sugar of lead drawer.

To obtain a satisfactory lead subacetate solution, it is, therefore, necessary to employ only crystallized lead acetate, free from efflorescence or carbonate, in its preparation.

The writer has examined fifteen samples of lead acetate, purchased in open market, with avoidance of duplication of source.

In the course of these examinations the advisability of introducing some means of estimating the lead strength of the salt, either gravimetrical or volumetric, became apparent, and a consideration of the subject may be urged upon the Committee of Revision of the Pharmacopœia.

The British Pharmacopœia has given directions for the volumetric estimation of the salt by means of sulphuric acid.

In an examination of fifteen samples of lead acetate, the writer found calcium in every specimen in varying amounts.

As the presence of this impurity may interfere slightly with an accurate estimation by means of normal sulphuric acid, decinormal potassium bichromate solution was employed as precipitant, and the number of c.c. necessary to precipitate 1 gramme of the salt determined.

This precipitant was suggested by the method of F. Lux in the valuation of red lead.

This author directs the decinormal solution to contain 14·761 grammes to 1 litre, each c.c. being equivalent to ·0207 gramme of lead.

If the decinormal solution of the U. S. Pharmacopœia, containing 14·689 grammes to the litre, be employed, each c.c. is approximately equivalent to ·02064 of lead, and consequently ·0378 of lead acetate.

Before, however, giving directions for a volumetric estimation, a standard of purity for the acetate must be fixed.

If allowance is made for impurities amounting to 2 per cent., we have the following calculation: $\frac{\cdot 98}{\cdot 0378} = 25\cdot 9$ c.c.

Nitrate of silver is used as an indicator to determine the end of the reaction, and as a slight excess of the bichromate solution is necessary for the development of the red silver chromate, it may safely be made 26 c.c.

The following addition may, therefore, be recommended to the Pharmacopœia:

One gramme of lead acetate, dissolved in 15 c.c. of water and acidulated with acetic acid, should require at least 26 c.c. of decinormal potassium bichromate solution for complete precipitation (presence of 98 per cent. absolute lead acetate).

Special directions for determining the end of the reaction by means of silver nitrate may also be added.

A number of commercial samples of lead acetate were examined in the following manner:

4 grammes of the salt were dissolved in sufficient recently-boiled distilled water to measure 40 c.c.

The degrees of opalescence of the solutions were noted.

10 c.c. of the solution were acidulated with acetic acid and estimated by means of the bichromate solution.

10 c.c. more were *filtered* and also precipitated in the same manner.

This procedure was employed with the object of determining the difference between the acetate as found and the actual amount of *soluble* acetate in the sample.

EXAMINATION OF COMMERCIAL LEAD ACETATE.

	Appearance.	Appearance of Sol. in H_2O	Precipitation with Pot. Ferrocyanide.	$\frac{n}{10}$ $K_2Cr_2O_7$ Titrate of Acidulated Unfiltered sol.	Titration of Filtered Sol.	Treatment with NH_4OH after Ppt'g. with H_2SO_4.	Fe.	Ca.
1	Granular marked C. P.	Very opalescent	Pure white	26·8	26·5	Flocculent reddish	Present	Present
2	do	do	do	28·6	27·3	do	do	do
3	Granular	do	do	26·9	26·5	do	do	do
4	Crystals	Slightly opalescent	do	27·9	27·2	do	do	do
5	do	do	do	27·8	27·3	do	do	do
6	do	Somewhat opalescent	do	26·9	26·7	do	do	do
7	do	Slightly opalescent	do	27·0	26·5	do	do	do
8	Mixture of powd. and crystals	Opalescent	do	26·3	26·0	do	do	do
9	Mixture of opalescent and cryst'ls	do	do	26·8	26·5	do	do	do
10	Opalescent pieces	do	do	28·0	27·2	do	do	do
11	do	do	do	26·7	26·4	do	do	do
12	Marked C. P. U. S. P. much efflor.	do	do	29·7	29·2	do	do	do
13	Crystals	do	do	28·1	27·7	do	do	do
14	Mixture of powd. and crystals	do	do	27·9	27·1	do	do	do
15	Crystals	Slightly opalescent	do	27·1	26·7	do	do	do

In the table furnished above the results obtained are recorded.

A portion of the remaining solution was precipitated by potassium ferrocyanide solution, as directed by the Pharmacopœia.

The remaining solution, acidulated with acetic acid, was precipitated by means of sulphuric acid.

The filtrate from the precipitated sulphate was examined for iron and calcium in the usual manner.

COMMERCIAL LITHARGE.

A good quality of lead oxide is indispensable in the preparation of Goulard's extract and similar galenicals. Among the queries presented to the A. Ph. A., the following is found:

Commercial litharge is grossly adulterated. What are the adulterants and in what quantity are they present?

The writer examined twenty-five samples of litharge, obtained in each case, as far as known, from a different source. Physically the respective specimens differed little, but evident carelessness in keeping the oxide, especially when procured from paint shops, was apparent.

The color varied in few instances; several samples, however, contained red lead, which was revealed by special examination.

The specimens were examined according to the pharmacopœial directions as to the amount insoluble in acetic acid.

A portion of the acetic solution was precipitated by means of sulphuric acid, and the filtrate examined for copper and iron by means of ammonia water.

Further examinations for zinc, aluminum and calcium were also made in the usual manner.

Every sample of litharge examined contained iron and calcium; aluminum was present in some, while copper and zinc were either absent or present only in trifling amounts.

During the course of these examinations the pharmacopœial directions were found inadequate for complete valuation of commercial litharge, and the necessity of directions for gravimetric or volumetric estimation became apparent. The Pharmacopœia, for instance, gives directions for the determination of impurities insoluble in acetic acid, but fails to recognize the liability of the presence of soluble impurities or adulterants.

The logical deduction from this omission is the necessary introduction of a fixed valuation.

As in the case of the acetate, calcium is present in the lead oxide of commerce, and is liable to interfere, if normal sulphuric or oxalic acid is employed as precipitant.

A gravimetric estimation, by means of sulphuric acid and weighing the dried precipitated sulphate, from a solution of the litharge in acetic acid, was originally employed by the writer, but was discarded for the less tedious volumetric estimation with decinormal potassium bichromate solution.

Before directing the proper precipitant, however, the Pharmacopœia must fix a standard and require a definite per cent. of lead oxide in commercial litharge.

The pharmacopœial limit as to the amount of moisture and carbonate is 2 per cent., that of insoluble impurities 1·5 per cent.

If, in addition to this, another allowance of 1·5 per cent. is made for impurities soluble in acetic acid, such as zinc, calcium, iron, aluminum, etc., an actual percentage of 95 of lead oxide can be demanded in litharge.

If decinormal potassium bichromate solution is employed, ·95 gramme of absolute lead oxide, when in solution, should require for complete precipitation 42·8 c.c.

As each c.c. is equivalent to ·02064 Pb, it is equivalent to ·022236 of lead oxide.

We have, consequently, the following division:

$$\frac{\cdot 95}{\cdot 022236} = 42\cdot 7$$

and as a slight excess of the dichromate solution is necessary, the above amount can be demanded.

The following addition to the pharmacopœial description of lead oxide may be introduced:

One gramme of lead oxide, dissolved in 5 c.c. of acetic acid, diluted with 5 c.c. of water, by means of a gentle heat, should require for complete precipitation at least 42·8 c.c. of the decinormal potassium bichromate solution, using silver nitrate solution as indicator.

In the following examination of twenty-five specimens of litharge, the pharmacopœial directions were followed, except in the determination of carbonate and moisture.

As volumetric determinations were made, this was not deemed necessary.

In the samples of litharge examined, not one was found which could be considered as grossly adulterated.

EXAMINATION OF COMMERCIAL LITHARGE.

	Soluble in acid if effervescing.	Amount of residue after solution in $HC_2H_3O_2$	Nature of residue insoluble in $HC_2H_3O_2$	Volumetric or gravimetric est. of PbO	Addition of NH_4OH after pption. with H_2SO_4	Iron.	Calcium.	No. of c.c. of $\frac{n}{10}$ $K_2Cr_2O_7$	Amount of PbO_2	Amt. dissolved by shaking 10 gms. with 100 c.c. H_2O
1	no effervescence	2·77 per cent.	metallic and silicious	95·4 per cent.	slight brown ppt.	small quantity	present	42·9	none	no loss
2	very slight	1·3 " "	silicious	97·2 " "	do	do	do	43·8	do	
3	slight	·7 " "	sandy	98·9 " "	very slight ppt.	do	do	44·4	do	no loss
4	do	·6 " "	sandy	98·2 " "	do	do	do	44·2	do	little loss
5	pronounced	1·61 " "	brown umber-like	95·8 " "	flocculent brown	present	present	43·1	do	·04 gm. in 10·0 gms. PbO
6	some effervescence	·65 " "	grayish	97·4 " "	do	do	do	43·9		·067 in 10·0 PbO
7	much effervescence	3·44 " "	dark brown	95·1 " "	do	do	do	42 8	2· per cent.	no loss
8	some effervescence	1·6 " "	metallic reddish	95·9 " "	do	do	do	43·2	none	·067 in 10·0 PbO
9	much effervescence	1·62 " "	brick-like	95· " "	very dec. brown	decided presence	do	42·7	not exam.	·04 in 10·0 PbO
10	effervescence	1·68 " "	metallic	96·1 " "	yellowish brown ppt.	present	do	43·3	do	·05 in 10·0 gms.
11	much effervescence	2·52 " "	reddish brown	95·2 " "	reddish yellow ppt.	do	do	42·8	1·5 p. c.	·02 in 10·0 gms.
12	do	2· " "	dirty gray	97·5 " "	do	do	do	43·9	none	·025 in 10·0 PbO
13	do	1.43 " "	metallic	96·95 " "	do	do	do	43·7	none	·1 in 10·0
14	some effervescence	2·42 " "	whitish	94·37 " "	red ppt.	do	do	42·5	present but not estim.	·025 in 10· PbO
15	some effervescence	2·62 " "	reddish	96·2 " "	red ppt.	very prominent	small amt.	43·4	2· per cent.	no material loss
16	do	2·02 " "	metallic	97·4 " "	do	present	present	43 9	none	·035 in 10·0 gms.
17	little effervescence	2·1 " "	metallic whitish	95·32 " "	do	present	present	42·9	none	·025 in 10·0 Pb
18	effervescence	1·31 " "	metallic	96·1 " "	do	present	do	43·3	none	·067 in 10·0
19	do	3·25 " "	do	95·45 " "	do	present	do	42 9	none	·025 in 10·0 PbO
20	consid. effervescence	1· " "	do	95·02 " "	do	decidedly	consid. amt.	42·8	not exam.	·025 in 10·0
21	little effervescence	·02 " "	reddish gray	99· " "	slight ppt.	slight	small amt.	44 6	none	no apparent loss
22	do	1·2 " "	metallic reddish	97·9 " "	do	present	present slight	44·0	do	do
23	effervescence	·8 " "	brick-like	98·0 " "	do	do	presence	44·1	do	do
24	do	·81 " "	do	96·82 " "	do	do	present	43·5	do	do
25	do	2· " "	dirty gray	97·1 " "	do	do	present	43·7	do	do

CERATUM PLUMBI SUBACETATIS.

Probably one of the most unsatisfactory official preparations used for inunction is Goulard's cerate.

Its liability of becoming rancid in a comparatively short time is a source of annoyance to many pharmacists who are compelled to keep a stock of the cerate on hand.

The alkaline nature of the lead subacetate solution has the tendency to saponify the fat employed, and in our older text-books on pharmacy the statement is found that a kind of lead soap is formed.

Continental pharmacopœias endeavor to overcome this difficulty by the substitution of paraffin ointment bases for animal or vegetable fats, changing the preparation from the nature of a cerate to that of an ointment.

But in the employment of petrolatum and similar ointment bases one of the most important objects of Goulard's cerate, its cooling property, is impaired, and this substitution is, therefore, of doubtful value.

The following is the official formula:

	Grammes.
Solution of lead subacetate	200
Camphor cerate	800

Mix them thoroughly.

This cerate should be freshly prepared when wanted for use.

The Pharmacopœia gives the operator no special directions how to mix the cerate.

Mixing without melting, with the usual method of incorporation with a spatula on an ointment slab, is doubtlessly to be understood. It is questionable, however, if this method is exclusively followed, especially when large quantities of the cerate are prepared.

The ease and rapidity of incorporating the subacetate solution with the melted cerate is too tempting, particularly if the Pharmacopœia does not furnish prohibitory directions.

It is obvious that the stated saponification is more liable to occur by the employment of this process than where mixture without heat is effected.

An objectionable feature of animal fats in this preparation lies in the production of a yellow or reddish color on standing. This is not only likely to occur in the stock jar of the pharmacist, but in the ointment container of the patient as well, frequently giving rise to unpleasant suspicions.

To prevent this discoloration, the addition of acetic acid to the the fresh cerate is recommended, but it must be considered that this addition is liable to change the chemical character of the lead solution.

The writer has employed various ointment bases for the preparation of Goulard's cerate.

Petrolatum, either yellow or white, will not answer on therapeutical grounds.

The substitution of olive, almond, lard or cotton-seed oil in place of lard in camphor cerate, similar to one of the 1870 Pharmacopœia methods, appears to furnish no improvement concerning preservation.

Some months ago the writer suggested to several physicians the substitution of hydrated wool fat for the camphor cerate, but invariably recommended recent preparation.

The results have, as far as known, been satisfactory, both from the standpoint of preservation as well as therapeutic action.

More recently anhydrous wool fat has been substituted, with the object of doing away with the excess of aqueous liquid.

Eighty grammes of the wool fat, commercially known as Adeps Lanæ, were melted at a low heat, and 20·0 grammes of lead subacetate solution incorporated by stirring until cool.

The finished ointment closely resembles lanolin in appearance, has a satisfactory therapeutic action, and does not show any signs of deterioration on two months' standing. This time is, however, too brief to draw any definite conclusions.

The disadvantage of the lanolin substitute for Goulard's cerate may be found in the ropy consistence of the ointment base.

Unless warmed, satisfactory inunction cannot be accomplished.

Finally, the writer would suggest the following rough valuation of the quality of Goulard's cerate:

Two grammes are introduced into a wide-mouthed vial, holding about 15 c.c.—a half-ounce homœopathic bottle will answer—and 10 c.c. of chloroform added.

The mixture is shaken occasionally, until the fat is dissolved by the chloroform.

If the cerate is of recent preparation or of good quality, the milky mixture will separate into two layers on standing, the lower but slightly milky, and no precipitation will be found on the bottom of the vial.

In an old, rancid or ropy cerate, similarly treated, a white precipitate will be found, and if the cerate is discolored, the varying degrees of intensity will be revealed in the chloroform solution.

BALSAM COPAIBA, OIL OF COPAIBA, MASS COPAIBA, RESIN COPAIBA AND GURJUN BALSAM.

By Lyman F. Kebler.

The 1890 U.S.P. recognizes the first four of the above-named products. These are supplied, directly or indirectly, by leguminous shrubs and trees of the genus Copaiba, all natives of tropical America, excepting two African species. According to the investigations of J. C. Umney,[1] the African species supply a very different product from those met with in commerce coming from tropical America. All these varieties and the unknown composition of any of them contribute materially to the difficulties attending a qualitative analysis of the oleoresins.

In 1895 I made[2] a careful comparison of the available methods for detecting gurjun balsam in balsam copaiba. The conclusion arrived at then was that a modification of the glacial acetic acid test gave the most trustworthy results. Since contributing the article referred to above, I have tested many samples of copaiba, some of which were reported as coming to hand in original packages. In every case the glacial acetic acid test was relied on to reveal the presence of gurjun balsam.

Having had an opportunity for accumulating ample material, and to make a further study of the commercial products, it was thought the results and some comments might be of service for future reference. The results of this examination are tabulated below.

The articles examined two years ago, and the samples in the table, marked copaiba, represent the commodity largely used in commerce. Sample collected in 1846 was kindly furnished by Prof. Remington, from his cabinet. The Para samples were very good, except one, which had a specific gravity of 0·9874 at 15° C. This was probably not a normal Para copaiba, but a more concentrated oleoresin. The solidifiable copaiba fairly represents the commercial article. I have never examined a sample that had a specific gravity below 0·9800 at 15° C. and solidified well.

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[1] 1891, *Pharm. J.*, Trans. (3), 22, 449. Am. Jour. Pharm., 64, 33. 1893, *Pharm. J.* Trans. (3), 24, 215. Am. Jour. Pharm., 65, 544.

[2] Am. Jour. Pharm., 67, 394.

Source.	Kind of Balsam.	Specific Gravity at 15° C.	Specific Gravity at 25° C.	Per cent of Oil Distilled from Metallic Bath.	Boiling Point of such Oil, C°.	Specific Gravity of such Oil at 15° C.	Specific Gravity of Steam-Distilled Oil at 15° C.	Specific Gravity of Steam-Distilled Oil at 25° C.
Carthagena.	Copaiba	0·9560	0·9506	53	250–265	0·9207	0·8997	0·8981
South America	Copaiba	0·9416	0·9372	56	253–268	0·9174	0·9014	0·9000
Cent. America	Copaiba	0·9526	0·9467	76	250–274	0·9231	0·9132	0·9067
Collected in 1846	Copaiba	0·9410	0·9381	62	253–270	—	0·9036	0·8978
South America	Para	0·9254	0·9209	90	258–270	0·9116	0·9079	0·9066
South America	Para	0·9661	0·9583	88	254–268	0·9100	0·9093	0·9037
South America	Para	0·9874	0·9818	54	253–265	0·9346	0·9019	0·9100
South America	Para	0·9176	0·9116	92	256–268	0·9150	0·8951	0·9043
South America	Para	0·9146	0·9101	90	254–264	—	0·8936	0·8904
South America	Solidifiable	0·9926	1·0000	23	260–269	0·9283	0·9201	0·9172
Commerce . .	Gurjun	0·9576	0·9516	—	—	—	0·9200	0·9146
Commerce . .	Gurjun	0·9796	0·9722	54	245–263	0·9202	0·9192	0·9141
Commerce . .	Gurjun	0·9531	0·9476	66	240–260 B. P. of Oil	0·9146	0·9093	0·9176
Commerce . .	—	—	—	—	248–263	—	0·9104	0·9087
Commerce . .	—	—	—	—	260–269	—	0·9133	0·9101

The samples of gurjun were all secured in New York. The two latter items represent commercial oil of copaiba, the last is adulterated with oil of gurjun and the other is pure. The specific gravities at 25° C. were simply taken for data.

There is a very limited demand for solidifiable copaiba, mass copaiba and resin copaiba. The article of which large quantities are used is a copaiba containing from 40 to 60 per cent. of oil. The representative of a large essential oil firm informed me that 1,000 pounds of the latter were sold to *five* pounds of the solidifiable, and *three and one-half* pounds of the resin. This included the territory from Detroit, Mich., east to the Atlantic, through Canada and south to Philadelphia and vicinity. If the above territory is at all representative of the country covered by the U.S.P., it would appear that the commodity which is used more than all the other copaiba compounds ought to have been recognized by our Pharmacopœia.

The present requirements of the Pharmacopœia for balsam copaiba (properly an oleoresin of copaiba) have undoubtedly wrought hardships for some well-meaning druggists. Only the solidifiable is recognized, and practically nothing but an unofficial article is used. From this it can readily be seen that in ninety-nine cases out of a hundred the average druggist is violating the requirements of the Pharmacopœia when he dispenses copaiba, and is thus rendered culpable, especially in some states.

The requirements of the Pharmacopœia for oleoresin of copaiba (balsam copaiba) are also quite inadequate for the end in view. The range of specific gravity for solidifiable is rather too low; 0·9800-1·0173 would be better. On removing the oil, the residue may or may not be brittle, in the absence of any fixed oil. I have removed 90 and 92 per cent. of oil from Para copaiba, and the residue was even then far from being brittle.

The test for detecting gurjun balsam when the article is heated to 130° C. must be in error, since none of the samples of gurjun submitted to this test by me have ever congealed, but became only slightly more viscous. Such a test becomes worthless in mixtures. The other test for gurjun balsam is unreliable.

The tests for oil of copaiba are fairly good. According to my work, the range of specific gravity ought to be a little greater. A test for oil of gurjun should be given. The specific gravity of the latter is a little higher than that of the oil of copaiba; gurjun oil is also somewhat darker in color, but in mixtures these can readily be adjusted.

Resin copaiba might well be dismissed from the Pharmacopœia without any inconvenience to the drug trade. If it is retained, more stringent requirements ought to be added. As it is, almost any resin will answer.

The therapeutical side of the copaiba compounds is an interesting one. The various authorities are generally agreed that an oleoresin containing from 40 to 60 per cent. of oil is the one best suited for gonorrhœal affections and kindred diseases. Those writers who make any comparisons between the oil and the oleoresin almost universally concede the oil to be less efficient than the oleoresin. One recent eminent authority says the oil distilled from the oleoresin is of little value. The same writer considers mass copaiba as a useless and clumsy form of giving the pill.

In U. S. Dispensatory, 17th edition, foot-note, page 445, is the following: "As the virtues of copaiba depend mainly on the oil, this variety (Para) should be more efficacious than the copaiba in common use." Here is room for more therapeutical study. It is evident that the oleoresin containing from 40 to 60 per cent. of oil, and the oil ought to be recognized by the U.S.P., but the other copaiba compounds could be dismissed.

SHALL FERMENTED AND DISTILLED LIQUORS BE DISMISSED FROM THE UNITED STATES PHARMACOPŒIA?

By Joseph W. England.

The recommendation of the President of the American Pharmaceutical Association, Mr. J. E. Morrison, in his annual address delivered before the recent meeting of that body, held at Lake Minnetonka, that fermented and distilled "liquors" be not recognized by the U. S. Pharmacopœia as medicinal agents—which recommendation, by the by, was voted down by the Association—and the paper by N. S. Davis, A.M, M.D., LL.D., on "The Therapeutic Properties of Alcohol and the Reasons why the Fermented and Distilled Liquors used as Beverages should not be Recognized in the Pharmacopœia as Medicinal Agents,"[1] have both excited interest in the medical and pharmaceutical professions.

President J. E. Morrison, of the American Pharmaceutical Association, takes the ground that the sale of "liquors" by druggists has done an incalculable amount of injury to American pharmacy, that the Government has placed pharmacists who sell "liquors" on the same footing as saloon-keepers; that this condition of affairs should be terminated by the complete abolition of every form of dealing in fermented or spirituous liquors, and that a great advance in this direction would be taken if it were decided to discard all such preparations from the U. S. Pharmacopœia.

The question as to whether fermented and distilled liquors shall be dismissed or not from the U. S. Pharmacopœia is, to my mind, wholly a medical question. If these liquors have sufficient *therapeutic* worth to warrant their use in medical practice, they should be retained. If they have not, they should be dismissed. It is not a matter of sentiment either for or against the liquor traffic. It is a matter of simple justice to the sick. So long as "liquors" are prescribed by a majority of physicians and used by the sick, so long should our national guide-book recognize them, and demand a certain standard of quality, the same as it does for any other *drug*. The mere fact that "liquors" are recognized by the Pharmacopœia

[1] Read before the Section on Materia Medica, Pharmacy and Therapeutics of the American Medical Association, at the meeting held June 1–4, 1897. *Journal of American Medical Association*, August 21, 1897. American Journal of Pharmacy, October, 1897.

does not compel a druggist to keep or sell them if he does not wish; but it does compel him, if he sells them on the orders of physicians, to sell them of a certain quality, or violate official standards. On the other hand, if "liquors" were not officially recognized, there would be no medicinal standards, and the sick would suffer. A "liquor" is sold, or should be sold, by pharmacists only as a drug. If sold for any other reason, then the liquor-dealers masquerading as druggists should be legislated out of the business. The sick should not be punished for needing liquors, nor denied the privilege of obtaining them of standard quality.

Dr. N. S. Davis, in his paper, claims that *physiological* experiments have shown that the presence of alcohol in human tissues retards natural metabolic changes, lessens the processes of oxidation and elimination, diminishes nerve-sensibility, and when repeated from day to day, induces cell and tissue degeneration. What the changes would be in human tissues undergoing *abnormal* metabolic changes, he does not refer to, and yet the clinical value of a drug is an all-important factor. Physiological experiments are necessary, and are good enough, as far as they go; but unless confirmed by clinical results, they are not conclusive.

Further, Dr. Davis alleges that while the present United States Pharmacopœia recognizes wine, whiskey and brandy, *it "does not give a definite official standard of alcoholic strength for either of them."* This is an error. While no *fixed* standard is given, yet it is demanded that white and red wine shall contain 10 to 14 per cent., whiskey 45 to 50 per cent., and brandy 39 to 47 per cent. of alcohol. The most radical claim, however, in Dr. Davis' paper, and the one, doubtless, that will be most disputed by clinicians, is the assertion that alcohol is the *only* important therapeutic agent in all "liquors," and if other therapeutic agents exist in addition to alcohol, that their proportionate quantity and quality is far more variable than is their per cent. of alcohol.

"Almost the only constituents," he writes, "found in whiskey and brandy, besides the alcohol and water, are very variable quantities of *fusel oil*, tannin and, in very old specimens, a trace of some ethereal substance to which connoisseurs attribute the special bouquet. So far from adding to the therapeutic value, the first two substances are regarded as very undesirable impurities, and the last-named has never been isolated in sufficient quantity to have its medical qualities tried."

Let us first note the inaccuracies of these statements. While fusel oil or amylic alcohol is found in recently distilled whiskeys, it is not found in those that have been properly aged, or, if present, it is present, as stated by the Pharmacopœia, in traces only. The Pharmacopœia requires the absence of *all* fusel oil from the official brandy. As to the oak tannin in whiskey and brandy, from the casks, it is only present in traces, and it is difficult to see how it can be regarded as a very undesirable impurity.

If "liquors" have therapeutic worth over simple mixtures of alcohol and water in fixed strengths—and the burden of clinical evidence is that they have—this value must be due to the extractive matters contained in them; and it is upon this line, with regard to a certain constituent of whiskey, that a few words may be said.

During the past five years the writer has examined many samples of whiskey chemically, and next to the alcoholic strength and the absence of fusel oil, one of the most important factors in such examinations has been the determination of the total acidity. The importance of this factor has been generally overlooked, and was pointed out to me by the late Prof. John M. Maisch, who said that he had examined many barrels of whiskey during the Civil War, for the Government, and always found that the best whiskeys had the highest acidity. He referred me to a paper in the AMERICAN JOURNAL OF PHARMACY (1859, p. 573), which he had translated from the German, wherein S. J. Kappel showed the presence of valerianic acid, and the absence of acetic acid, in potato and in rye whiskeys, and expressed the opinion that while valerianic acid was probably the main acid of whiskeys, this had not been positively determined. Since then, the writer has been especially observant of the acid factor in whiskey examinations, and has found that, generally, the oldest, fusel-oil-free, highest-priced, and most strongly alcoholic whiskey has the highest acidity. Occasionally there is an exception. A raw whiskey may be so refined before aging that it will not have the usual amount of the acid-forming compounds, and hence show a low acidity.

The Pharmacopœia of 1890 demands a whiskey "at least two years old," and requires that to render 100 c.c. of whiskey distinctly alkaline to litmus there should be required not more than 1·2 c.c. of normal potassium hydrate solution.

To determine the acidity, a very much better way than the official

method is to use a *decinormal* solution of sodium hydrate, rather than the official normal solution of potassium hydrate, and to employ *10 c.c.* of whiskey, rather than 100 c.c. Place the sample to be examined in a flat-bottomed test tube, resting on a piece of white paper, add a few drops of phenolphthalein solution—do not use litmus, as it is not sufficiently delicate—and run in the soda solution from a burette (graduated to a tenth c.c.). By a little practice, and especially by "checking" results, the end reaction may be very quickly and accurately determined. To measure the whiskey the writer uses a 5 c.c. pipette, graduated to the twentieth of a c.c. Probably one graduated to the one-tenth would answer equally as well.

The results had, during the past five years, in determining the total acidity of some seventy-five samples of whiskey, according to the above method, in the number of cubic centimetres of decinormal sodium hydrate solution needed to neutralize 10 cubic centimetres of a sample, were as follows:

1893:—1, 1·1, 1·4, 1·8, 1·2, 0·6, 1, 1·1, 1·2, 1·3, 1·8, 1·5, 1·5, 1·5, 1·5, 1·5, 1·5, 1·5.

1894:—1·4, 1·2, 1·6, 1·3, 1·3, 0·9, 0·9, 1·3, 1·3, 1·6, 1·6, 1·6, 1·7, 1·7, 1·6.

1895:—1·7, 1·6, 1·4, 1·3, 1·3, 1·3, 1·8, 1·4, 1·5, 1·6, 1·9, 1·6, 1·8, 1·7, 1·4, 1·4.

1896:—1·2, 1·2, 1·1, 1·3, 1·7, 1·7, 1·2, 1·5, 1·5, 1·5, 1·5, 1·4.

1897:—1·6, 1·3, 1·3, 1·7, 1·3, 1·2, 1·3, 1·5, 1·3, 0·4, 0·5, 0·6, 1·6, 1·7.

It is important to note that the acidity of whiskey does not increase with age beyond a certain point. In May, 1895, the writer examined ten samples of whiskey. None of the samples were less than three years old. The results were in cubic centimetres of decinormal sodium hydrate solution used to neutralize 10 c.c. of whiskey, as follows:

1·7, 1·6, 1·4, 1·3, 1·3, 1·8 1·4, 1·5, 1·6, 1·6.

The same samples were examined a few days since (October, 1897), and the acidity was found to be unchanged.

If valerianic acid is the main acid in whiskey, the reaction in neutralization with sodium hydrate would be as follows:

$$HC_5H_9O_2 + NaHO = NaC_5H_9O_2 + H_2O$$

101·77 39·96 123·77 17·96

Assuming that, in good whiskey, an average of *15 c.c.* of deci-

normal sodium hydrate solution (or 1·5 c.c. of normal) was required to neutralize *100 c.c.* of whiskey, this would be equal to 0·06 gramme of NaHO. And if 39·96 grammes of NaHO neutralize 101·77 grammes of valerianic acid, 0·06 gramme should neutralize 0·15 gramme of acid, as follows:

$$39{\cdot}96 : 0{\cdot}06 :: 101{\cdot}77 : 0{\cdot}15.$$

In other words, each *fluid ounce* of whiskey would contain nearly ¾ of a *grain* of free valerianic acid.

The U.S P. (1890) standard of *1·2 c.c.* is, in the writer's judgment, too low for a good whiskey. It should be at least 1·4 or 1·5, and a three or four-year-old whiskey should be required instead of a "not less than two-years-old" product. The U.S P. of 1880 required that 100 c.c. of whiskey should be rendered distinctly alkaline to litmus by *2 c.c.* of the volumetric solution of soda. What the exact chemical changes are that take place in whiskey on aging, whether or not any acetic acid is formed from the ethyl alcohol by oxidation from the air during the process of fermentation, whether acetic ether is produced with acetic acid as an ultimate product, and whether the fusel oil or amylic alcohol present in raw whiskey is directly oxidized by age into valerianic acid, or is first converted into valerianic ether and then into acid, are all questions which have not yet been solved by chemical science, and remain for future work.

The extractive of whiskey most probably has therapeutic worth, as has also the extractives in wines and brandies, and before any action is taken by the Committee on Revision of the U. S. Pharmacopœia, looking toward the dismissal of these products, there should be a thorough and extended examination made of them chemically and therapeutically.

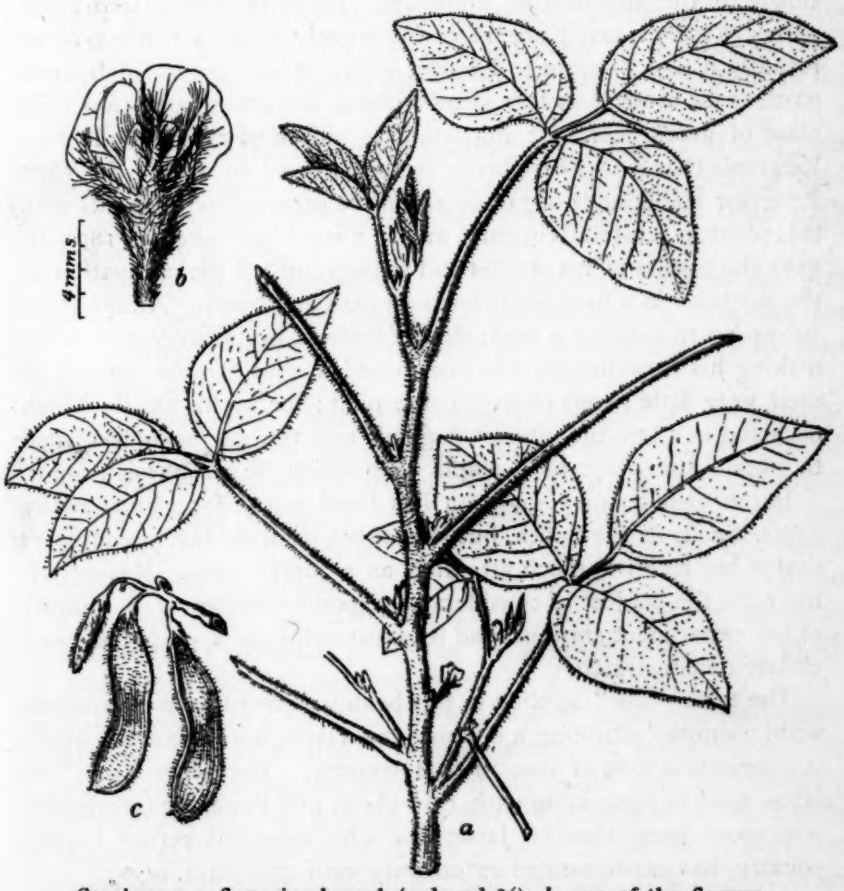
THE SOY BEAN.

By Henry Trimble.

In this Journal for June, 1896, the writer published a summary of the literature of this bean, which bean is of especial interest to pharmacists because of the digestive ferment said to exist in it. Recently the U.S. Department of Agriculture has issued Farmers' Bulletin No. 58, entitled "The Soy Bean as a Forage Crop," by Thomas A. Williams, under the direction of F. Lamson-Scribner, with an appendix on "Soy Beans as Food for Man," by C. F. Langworthy, Ph.D.

While not adding anything new to the knowledge of the digestive ferment, still there is so much valuable information in the report as to make it desirable to reproduce it in abstract.

General Characteristics and Origin.—The Soy Bean, Glycine hispida, previously, but incorrectly, called soja bean, is a leguminous



Soy bean: *a*, flowering branch (reduced ⅔); *b*, one of the flowers (enlarged); *c*, pods of soy bean (reduced ⅔).

plant, native of Southeastern Asia. De Candolle says that it originally occurred in the wild state in the region "from Cochin China to the south of Japan and to Java." It has been cultivated from very ancient times, and in some countries, notably Japan, it is a very important food plant, and its cultivation has reached such an

advanced stage that innumerable varieties and forms have been developed. Professor Rein says it is the most important legume in extent of varieties, uses, and value grown in China or Japan. It is supposed to have been used for food in China even before the time of Confucius. Although it has been grown in China and Japan for such an extended period, its cultivation seems to have spread very slowly to the surrounding countries. Its introduction into India seems to have taken place in comparatively modern times. More recently it was brought to Europe, where it was grown in botanic gardens for more than 100 years without attracting attention as a plant of much economic importance. Aiton says in his Hortus Kewensis that it was first brought to England in 1790. In 1875 Professor Haberlandt began an extensive series of experiments with this plant in Austria-Hungary, and in a work published in 1878 he gave the results of his studies and strongly urged the cultivation of the soy bean as a food plant for both man and beast. Although he succeeded in exciting a great deal of interest in its cultivation while making his experiments, and distributed a considerable amount of seed, very little seems to have come of it; for at his death, which occurred in 1878, the interest flagged, and the soy bean has failed to obtain the place as a staple crop which he prophesied for it.

In our own country soy bean has been grown for a great many years, chiefly in the South, but it is only within the last fifteen years that it has received much attention as a forage crop. Recently it has been the subject of considerable experimentation at a number of the experiment stations, and its great value as a crop has been clearly demonstrated.

The term "soy" applied to this bean is derived from a Japanese word "shoyu," denoting a certain preparation from the seeds which is a favorite article of diet in that country. The term "soja" is often used in connection with this plant, but Professor Georgeson, who spent some time in Japan, and who, since his return to this country, has experimented extensively with this plant, says:

The term soja, often applied to this bean, is misleading, inasmuch as the species named by Siebold and Zuccarini *Glycine soja* is not cultivated there (Japan), or at least rarely cultivated, though wild in the South; and later this species was confounded with the cultivated species, *G. hispida* Moench., whence the origin of the term soja, as applied to the cultivated bean.

Recent works on Japanese botany seem to substantiate this posi-

tion, though it is still a matter of doubt as to what botanical name properly belongs to the cultivated species.

The soy bean is an erect, annual plant, with branching hairy stems, trifoliate, more or less hairy leaves, rather unconspicuous pale lilac or violet-colored flowers, and broad, two to five-seeded pods covered, like the stem, with stiff, reddish hairs. The seeds vary in color from whitish and yellowish to green, brown and black, and in shape from spherical to elliptical and more or less compressed. Under favorable conditions the plant may reach a height of four feet or more.

In Professor Haberlandt's experiments in Austria-Hungary the plants yield about 200 pods and 450 seeds each, and though this is probably considerably above the average, it shows them to be remarkably prolific.

The fact that the flowers are self-pollinated makes the yield entirely independent of insects, and renders the soy bean free from an important obstacle in the way of the introduction of many legumes into new regions.

Varieties.—The different varieties of soy bean are distinguished largely according to the color, size and shape of the seed and the time required for the plants to reach maturity. The names applied in the United States are, for example, "Early White," "Medium Late Green," "Medium Black," etc. The early varieties generally fruit heavier in proportion to the size of the plant than the later ones, and hence are better to grow for seed, while the medium or late varieties are better for forage, on account of the larger yield of fodder that may be obtained.

Conditions of Growth.—It is believed in Japan that in northern climates soils of a rather strong character are best adapted to the soy bean. It is usually sown about the end of May, and when used for hay cut early in August. In both Europe and America it has been found to thrive best on soils of medium texture, that are well supplied with potash, phosphoric acid and lime. Fairly good results have been obtained in Kansas on very poor soils, and under very adverse conditions as to moisture. In South Carolina the soy bean gives excellent crops on sandy limestone or marshy soils, and also on drained swamps or peaty lands that are well marled. The temperature should be about the same as that required for corn. The methods of culture are such as are usually recommended for ordinary field beans.

Chemical Composition.—The following tables on the chemical composition of the various parts of the soy bean used for feeding purposes, have been arranged with great care, to show as far as possible the latest and best results obtained by experimenters in the United States during the course of their studies of this plant:

CHEMICAL COMPOSITION OF THE VARIOUS KINDS OF FORAGE MADE FROM THE SOY BEAN.

Soy-Bean Forage.	Number of analyses.	Fresh or Air-dry Substance.						Water-free Substance.				
		Water.	Protein.	Fat.	Nitrogen-free Extract.	Fiber.	Ash.	Protein.	Fat.	Nitrogen-free Extract.	Fiber.	Ash.
Fodder (early bloom to early seed)[1]	13	76.5	3.6	1.0	10.1	6.5	2.3	15.3	4.1	43.0	27.6	10.0
Soy-bean hay (Japanese)	1	16.0	16.9	2.2	23.1	35.9	5.9	20.1	2.6	27.5	42.7	7.0
Soy-bean hay (Mass.)[2]	4	12.1	14.2	4.1	41.2	21.1	7.3	16.2	4.7	46.8	24.0	—
Soy-bean straw (Mass.)[2]	3	11.4	4.9	1.9	37.8	37.6	6.4	5.5	2.2	42.7	42.4	—
Soy-bean straw (hulls and vines after threshing)[3]	1	5.7	4.0	0.8	36.0	49.5	3.9	4.25	0.85	38.2	52.6	5.3
Soy-bean seed[4]	8	10.8	34.0	16.9	28.8	4.8	4.7	38.1	18.9	32.2	5.4	5.3
Soy-bean meal[5]	2	10.4	36.0	18.9	27.0	2.6	5.1	40.2	21.0	30.2	2.9	5.7
Soy-bean ensilage[6]	1	74.2	4.1	2.2	7.0	9.7	2.8	15.7	8.7	27.0	37.6	11.0
Corn and soy-bean ensilage[7]	4	76.0	2.5	0.8	11.1	7.2	2.4	10.4	3.3	46.3	30.0	—
Millet and soy-bean ensilage[7]	9	79	2.8	1.0	7.2	7.2	2.8	13.3	4.8	34.3	34.3	—

[1] Ninth An. Rep. Storrs Exp. Sta., pp. 281, 285 (1896).
[2] Eighth An. Rep. Mass. Hatch. Sta., p. 87 (1896).
[3] Second An. Rep. S. C. Exp. Sta., p. 179 (1890).
[4] Bull. 15 U. S. Dept. Agric., Office Exp. Stations, p. 390 (1893).
[5] Eighth An. Rep. Storrs Exp. Sta., pp. 183, 186 (1895).
[6] Bull. Tenn. Exp. Sta., Vol. IX, No. 3, p. 106 (1896).
[7] Ninth An. Rep. Mass. Hatch Sta., p. 130 (1897).

If the preceding analyses are compared with those of other leguminous crops, it will be seen that the soy bean ranks high from a chemical point of view. The green fodder has much the same composition as red clover, being slightly lower in crude protein and higher in crude fiber. In the two most important substances, crude protein and fat, the soy bean is considerably richer than the cowpea. The hay also shows a relatively high fat and protein content. The only available analysis of soy bean ensilage shows it to agree very closely in composition with red clover ensilage, being higher in

crude fiber and fat, and lower in extract matter. From the analysis of the beans it will be seen that there are about two-fifths protein and one-sixth fat, with but very little fiber present, making them almost as rich in crude protein as the best cotton-seed meal, with a higher percentage of fat. They contain three times as much crude protein and nearly three and a half times as much fat as oats; nearly three and one-half times as much protein and about three times as much fat as corn, and almost twice as much crude protein, and over twelve times as much fat as peas; all of which show them to form one of the most concentrated of our feeding stuffs.

Digestibility.—The chemical analysis alone will not prove the feeding value of a forage crop. Soy bean meal has a high percentage of digestibility. It contains almost two and one-half times as much digestible protein, and over five times as much digestible fat as the common roller process, wheat bran, and its digestibility is decidedly higher in everything but the fat than that of cotton-seed meal. The experiments which confirmed these statements were made on cattle and sheep, chiefly the latter.

As a Soil Renewer.—One of the great advantages in growing leguminous forage crops lies in the benefit which the soil derives from the nitrogen and other important elements of plant food that are left in it by the crops. Soils that have become impoverished by continuous cropping with small grains of other nitrogen-using crops may be restored to fertility by the use of leguminous crops, as, for example, the clovers, cowpeas, vetches, lupines, and the soy bean. The value of a crop as a soil restorer depends upon the amount of available plant food which it adds to the soil, and also upon the effect which the roots have upon the mechanical condition of the soil. Leguminous plants, through the aid of the root tubercle organisms, are able to add to the available nitrogen of the soil, and hence are extensively used in restoring those deficient in that element.

The soy bean is highly valued in Japan as a nitrogen gatherer and is extensively grown in rotation with cereal crops. When the soy bean was first introduced into the United States it did not form root tubercles, owing to the absence of the tubercle organism from the soil, and it has been grown for several years in some localities without the appearance of any tubercles. In other cases the tubercles have developed in great abundance after a short time. At the

Massachusetts (Hatch) Station the medium green soy bean produces great numbers of the tubercles. At the same station it was found that a liberal application of nitrates interfered with the development of the tubercles.

In experiments made at the Storrs Experiment Station soy beans were planted in soil uninfested with the tubercle microbes, and then later in the season (about the middle of July) a portion of the field was inoculated with infected soil. Tubercles were produced on the plants in the inoculated land, but owing to the lateness of the inoculation, they made but little development, and no difference could be noticed between the crops grown on the two parts of the field.

Soy Beans as Food for Man.—The soy bean has been used as a food for man in Japan, China and neighboring countries, from the earliest times. In more recent years it has been cultivated for this purpose in Europe. Analyses were given in this JOURNAL, June, 1896.

Comparatively little information is available concerning the chemical character of the different constituents of the soy bean. According to the Japanese investigators, the bean contains, on an average, 7·5 per cent. of nitrogen, 6.9 per cent. being albuminoid nitrogen, exclusive of peptones, 0·1 per cent. amide nitrogen, and 0·3 per cent. nitrogen of peptones. Osborne studied the nitrogenous constituents of white or kidney beans. He found that they contained on an average 23·5 per cent. of protein, made up of phaselin and phaseolin. The percentage of protein in the soy bean is much higher than this, and it is not improbable that it differs materially in chemical character. According to Japanese authors, the soy bean contains no starch. No statements have been found concerning the character of the fat.

The fact is well recognized that beans of all kinds are valuable food because of the large amount of protein and fat which they contain. In order that the nutrients may be available, the beans must be cooked or prepared in some way so that the cell walls may be broken down and the contents readily acted on by the digestive juices. What is true of beans in general, is especially true of the soy bean. Though it is eaten more extensively in China and Japan than in any other countries, so far as can be learned it is never eaten there as a vegetable, but more or less complex food products are prepared from it. At least five preparations are commonly made in

Japan from the soy bean. These are natto, tofu, miso, whose preparation has already been described in this Journal, and yuba and shoyu.

A sort of film forms on the surface of soy-bean milk which in appearance suggests cream. This material is sometimes prepared in quantity by evaporating the milk, and when dried it is used as an article of food under the name of yuba.

Shoyu is a sauce prepared from a mixture of cooked and pulverized soy beans, roasted and pulverized wheat, wheat flour, salt, and water. The mass is fermented with rice-wine ferment in casks for from one and a half to five years, being very frequently stirred. The resulting product is a moderately thick brown liquid. In odor and taste it is not unlike a good quality of meat extract, though perhaps a trifle more pungent. Under the name of soy sauce it has been known in India, and to some extent in Europe, for many years.

The composition of each of the above-described foods is given in the following table:

Soy-bean food products.	Water.	Protein.	Fat.	Nitrogen-free extract.	Fiber.	Ash.
	Per cent.	*Per cent*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Fresh tofu	89·00	5·00	3·40	2·10	—	0·50
Fresh tofu	89·29	4·87	—	4·35	—	0·48
Frozen tofu	18·70	48·50	28·50	2·60	—	1·70
Natto	15·32	41·42	23·65	15·05	1·48	3·08
Yuba	21·85	42·60	24·62	7·65	—	2·82
White miso	50·70	5·70	24·40		12·60	6·60
Red miso	50·40	10·08	18·77		8·25	12·50
Swiss miso	12·53	26·43	13·91	19·54	1·41	26·18
Shoyu	63·29	8·31	—	5·10	—	19·45
Shoyu	67·42	7·37	—	4·06	—	17·47

It will be noticed that most of these soy-bean products are fermented; that is, they are prepared with the aid of microörganisms. The cell walls and other carbohydrate material are broken down and the cell-contents rendered more accessible to the digestive juices, and at the same time peculiar and pleasant flavors are developed. The special microörganisms used in the preparation of these foods have been studied in recent years. The manufacture of these

products is of very ancient origin, and affords an interesting practical illustration of the use of bacteria for economic purposes.

Though these soy-bean products are prepared chiefly in Japan and other eastern countries, their manufacture has been attempted to some extent in Switzerland and elsewhere.

The statement is frequently made that the Japanese live almost exclusively upon rice, eating little or no meat. It is not, however, generally known that the deficiency of protein in the rice is made up by the consumption of large quantities of shoyu, miso, or other soy bean products. It is stated on good authority that these products actually take the place of meat and other nitrogenous animal foods in the Japanese dietary. They are eaten in some form or other by rich and poor at almost every meal.

A large number of dietary and digestion experiments have been made in Japan in which soy bean preparations formed a considerable part of the food consumed, although no experiments have been made, so far as can be learned, in which such preparations were eaten alone. Generally speaking, the nitrogen was well assimilated. For instance, when 12 grammes of nitrogen were consumed daily, the dietary consisting of soy bean cheese and rice, only 0·1 gramme of nitrogen was excreted in the feces. When 13·9 grammes of nitrogen was consumed daily in a dietary of bean cheese and barley, only 1·4 grammes was excreted in the feces. According to one author, in a dietary containing a large amount of bean cheese, 90 per cent. of the protein, 89·9 per cent. of the fat, and 14·5 per cent. of the crude fiber are digestible. The general opinion of Japanese investigators and others familiar with oriental dietetics is, that the protein in articles of food prepared from soy beans is in a very available form, and that these preparations are most valuable foods.

Bean sausages in considerable variety are prepared in Germany, and formed part of the ration of the German soldier in the Franco-Prussian war. So far as can be learned, these are always made from ordinary varieties of beans and not from soy beans.

Since soy beans contain no starch, they have been recommended as food for persons suffering from diabetes. A soy bean bread for this purpose is manufactured in Paris.

Under the name of coffee beans, soy beans are eaten to some extent in Switzerland as a vegetable, and dried and roasted are also used as a coffee substitute. Their use for this latter purpose is not

unknown in America. The attempt has recently been made by certain dealers to place the soy bean on the market as a new substitute for coffee, and to sell it under other names at an exorbitant price.

Bulletin No. 98, of the North Carolina Experiment Station, recommends soy beans as a palatable vegetable when prepared as follows: Soak the beans until the skins come off, and stir in water until the skins rise to the surface and then remove them. Boil the beans with bacon until soft, season with pepper, salt and butter, and serve hot. If the beans are green the preliminary soaking may be omitted. No other references to the use of soy beans for human food in the United States have been found.

Several of the Bulletins issued by the College of Agriculture of the Imperial University of Japan contain valuable articles on the soy bean and its products.

THE PRESENT STATUS OF THE HYOSCINE-SCOPOLAMINE QUESTION.[1]

By Louis Merck, Ph.D.

Hyoscine has been an object of active controversies, more so, probably, than any other one of the notable alkaloids. These controversies, after apparently becoming dormant for a time, have again and again sprung up and engaged scientists of note on opposite sides.

It was from the so-called amorphous hyoscyamine, the mixture of bases obtained from hyoscyamine seeds, that Ladenburg first isolated a substance to which he gave the name of hyoscine. The same discoverer assigned to the newly-found base the formula $C_{17}H_{23}NO_3$, thus claiming it as an isomer of atropine and hyoscyamine. Hesse, on the other hand, contended that the new base was possessed of the composition $C_{17}H_{21}NO_4$. He also declared it to be identical with the substance which E. Schmidt had isolated from scopolia atropoides, and which had been named scopolamine. Subsequently, E. Schmidt found the hyoscine hydrobromate of the markets to consist almost exclusively of the hydrobromate of scopolamine. He does not, however, consider the *non-existence* of a hyoscine $C_{17}H_{23}NO_3$ to be thereby demonstrated. He argues in favor of the possibility that a base of such composition may indeed occur in

[1] *The Journal of the Society of Chemical Industry*, June 30, 1897.

the mixtures of alkaloids obtained from the solanaceæ; that Ladenburg had actually got hold of that base, which gave him the data for his formula and description of what he called "hyoscine," and that the same base has since then happened to be isolated again.

Be that as it may, the "hyoscine" put upon the market by E. Merck has been and is assuredly identical with scopolamine. It is only for the purpose of obviating misunderstandings in commercial and medical circles, where a change of name is apt to create great confusion, that our house has retained in its trade-list the designation of "hyoscine" for the base from hyoscyamus, while applying that of "scopolamine" to the base from Scopolia atropoides. Since the opening of this controversy, the Merck laboratories have, in working considerable quantities of the solanaceous drugs for alkaloids, steadily been directed toward the object of identifying a base $C_{17}H_{23}NO_3$, which is to possess the properties of hyoscine. So far, however, we have not succeeded in isolating such a base.

In the course of these labors we were indeed fortunate enough to isolate a base $C_{17}H_{23}NO_3$, thus isomeric with hyoscyamine and atropine, from Duboisia myoporoides. This base we have named "pseudo-hyoscyamine." Its properties, however, differ essentially from those known for hyoscine. For instance, hyoscine is an oily liquid, while pseudo-hyoscyamine melts at about 132° to 134°. Thus, the possibility of any confusion between these two appears wholly excluded. The base isolated from Duboisia myoporoides by J. Gadamer (albeit in quantity insufficient for exact determination) is equally unlikely to represent Ladenburg's "hyoscine," inasmuch as Gadamer, from his analytic results, concludes that it contains but 15 atoms of carbon. Our own investigations at the works covered these solanaceous drugs: Belladonna, duboisia, datura, stramonium, hyoscyamus, scopolia.

On examining even very large quantities of the bases residuary from the manufacture of atropine, we have so far encountered no substance which would, even approximately, be capable of identification with the "hyoscine $C_{17}H_{23}NO_3$." Furthermore, repeated efforts were made by us to isolate all the alkaloids from duboisia. All that were obtained on such occasions were: hyoscyamine, hyoscine (or scopolamine) $C_{17}H_{21}NO_4$, considerable quantities of amorphous bases, and pseudo-hyoscyamine. Never was an alkaloid met with in this work answering to the formula given by Ladenburg for

hyoscine, and at the same time possessing its characteristic properties regarding salts and double salts—properties which would have rendered such an alkaloid incapable of being overlooked. The same negative result was had from investigation of the alkaloids of stramonium seeds, which, likewise, were worked in quantities of thousands of kilogrammes. The Merck laboratories are also continually working, for alkaloids, large quantities of hyoscyamus seeds and scopolia roots. Also, in these lines of manufacture, we constantly kept our attention directed toward isolating the alkaloids occurring among the residuary bases. Nevertheless, the search for the particular base here in question has proved equally fruitless on these two drugs.

In this connection I may be pardoned the liberty of alluding to still another interesting fact developed at our laboratories. The statement is frequently met with in literature, that hyoscine (that is, scopolamine) has been isolated from the residual bases obtained in the manufacture of atropine. Therefore, it might readily be inferred that hyoscine is a side-base to hyoscyamine or atropine in the belladonna. We have studiously kept this issue in view during the working of many hundreds of thousands of kilos of belladonna roots. And still we have never been able to discover hyoscine (meaning scopolamine) among the residual bases resulting from these extensive operations. This experience of ours thus directly contradicts the inference before mentioned. The experiences of others, as quoted before, may be presumed to have been due to defective sorting of the belladonna roots, among which may have remained roots of other solanaceæ. Or, the residues remaining from the manufacture of various solanaceous alkaloids, and utilized for obtaining side-bases, may not have been kept absolutely apart.

It may be contended that, in the Merck researches, the hyoscine or scopolamine that might have been present could have been overlooked in consequence of its own minimal quantity. This contention, however, is met by the fact that the mixtures of residual bases were, at the end, also subjected to splitting; whereupon the appearance of scopoline among the products of this operation must have indicated that hyoscine had been present, if such were indeed the case. From a single batch, for instance, of residual bases thus treated, 100 kilos of tropine were obtained, whereas the presence of a higher-boiling base was not demonstrable.

To return, after this little digression, to my main topic, I would once more summarize our laboratories' experiences regarding the latter, to wit: With due consideration of the various solanaceous drugs, and with the use of very considerable quantities of them, the results so far have failed to show the possibility of obtaining a base possessing the properties of hyoscine and answering to Ladenburg's formula of $C_{17}H_{23}NO_3$. Thus, this whole question has by this time dwindled down almost exclusively to a controversy between O. Hesse and E. Schmidt as to the propriety of designating the surely-established alkaloid $C_{17}H_{21}NO_4$, either as "scopolamine" or as "hyoscine."

The polemics between the two investigators named have, however, recently extended into still another chapter of the solanaceæ-alkaloid research, which bears close relations to the one I have here discussed. O. Hesse published an observation made by him in the scopolamine hydrobromate of commerce, to this effect: He frequently found this salt to contain also notable quantities of another base, differing from scopolamine by the absence of optical rotatory power. This would, of course, have the result that such a mixed salt would show a smaller arc of rotation than that due to the pure scopolamine hydrobromate.

He succeeded in isolating this inactive base and gave it the name of "atroscine." Hesse argues against any supposition of identity as between his "atroscine" and the so-called "inactive scopolamine," found by E. Schmidt. His reasons herefor are two: Firstly, he did not succeed in obtaining, by the treatment of hyoscine with alkalies, an inactive base of equal composition. Secondly, he claimed, on the other hand, that the decrease in optical activity resulting in hyoscine upon treatment with alkalies is due altogether to a splitting of the hyoscine into a "split-base," which he calls "oscine," and tropic or atropic acids. O. Hesse's "oscine" is stated as being identical with E. Schmidt's split-base "scopoline."

E. Schmidt, again, gives the genesis of his "inactive scopolamine" as being likewise brought about through the action of alkalies on scopolamine, with the additional statement that it can also be produced by using silver oxide instead of the alkalies. He states that he never encountered any "atroscine" in the process of isolating alkaloids from commercial scopolia roots or hyoscyamus seeds. Schmidt further explains that accordingly as the liquors from scopolia root are treated with less or more intensively-acting alkalies,

one may obtain at will either a normal scopolamine (rotating about 24° to 25°), or a feebly rotating one. He succeeded even in directly obtaining, from one and the same scopolia root, a normally (that is, strongly) rotating and a feebly rotating scopolamine. The former was obtained by alkalinizing the liquors with sodium bicarbonate or ammonia; the other by employing strong bases, such as soda-lye, concentrated solution of potassa, etc.

It is thus still an open question whether or not Hesse's "atroscine" should be regarded as identical with Schmidt's "inactive scopolamine." Upon considering the contradictory verdicts of medical authorities who have tested both these substances as to their action on the eye, one might almost incline toward the second alternative, that is, non-identity.

O. Hesse, in his treatise, quotes medical councillor Dr. Königshöfer's conclusions from physiological tests made by him with atroscine, to the effect that its action differs in certain points from that of scopolamine. The passage quoted reads as follows: "We thus find that this remedy (that is atroscine) acts identically with atropine and scopolamine, in so far as its mydriatic effect is concerned; while in the matter of paralyzing the accommodation it considerably surpasses both these substances in promptness of action, as well as in duration of effect, the ratio of difference ranging from double to quadruple."

E. Schmidt, on the other hand, reports that Prof. Dr. Uhthoff, director of the eye clinic at the University of Marburg, in conjunction with Dr. Axenfeld, lecturer, arrived at the following important conclusion: In comparative tests with a strongly rotating scopolamine hydrobromate (25·43°) and a very feebly rotating salt (6 62°), " . . . it was found that no difference, whatever, could be shown between the effects of these two salts."

To these contradictory reports published by Schmidt and by Hesse, I can add the following facts, gathered from observations made by us at the Darmstadt Laboratory. Ever since this property of hyoscine, of strongly rotating the plane of polarization, has been known, special regard has been given to this point at our laboratories in working the side-bases from hyoscyamus seeds for hyoscine. The product of each separate batch was invariably examined for the determination of its optical properties. In the course of these observations it was found that we always obtained a

hyoscine of normal rotatory power with but very slight variations, that is, ranging between about 24° and 25°. We have been unable so far to discover a feebly rotating preparation obtained from hyoscyamus seeds.

In the manufacture of scopolamine from scopolia roots, we made the optical rotatory power a subject of special research only quite recently, and in consequence I can give you the results only on an amount of scopolamine obtained from about 10,000 kilos of the roots. The scopolamine hydrobromate from this quantity, on being crystallized, was shown to be absolutely pure, but to possess a lævo-rotatory power of only 13·47°.

In connection herewith I should state that, in working the scopolia roots and in working up the side-bases for scopolamine, exactly the same stages were adhered to, as in working the hyoscyamus seeds and in working up their side-bases for hyoscine. Especially in the manner of using alkali in both series, the most punctilious care and attention were exercised in order to make the conditions in both exactly equal. Hence, I cannot well refrain from the conclusion that the alkali can hardly have caused the difference in rotatory power in these cases of ours; for had it done so, a more feebly rotating product must have resulted in the isolation of the hyoscine as well as in the other case. This experience seems to me to argue largely in favor of O. Hesse's view, that two chemically equal basic substances, which so far can be distinguished from one another only by their optical activities, are contained in the ordinary scopolamine hydrobromate, and that, quite possibly, they exist preformed already in the scopolia root.

The few observations so far available cannot, of course, suffice to settle the pending controversy; but it affords me gratification to be in a position to promise the early publication of further results from considerably larger batches of scopolia roots, in which, likewise, the various results will be most carefully noted, which I hope may contribute toward the elucidation of this question.

Tonca or *Tonquin Beans*, according to *Bulletin of Miscellaneous Information*, Trinidad, October, 1897, were imported from Venezuela in 1896 to the value of £130,985. Rum to the extent of 11,000 gallons was used in curing them; the greater part of the product was shipped to the United States, only £1,091 in value going to other places. See also this JOURNAL, March, 1897, page 157.

THE MANUFACTURE AND APPLICATIONS OF LACTIC ACID.[1]

By Alan A. Claflin.

This paper consists of extracts from notes on observations taken during seven years' experience in the manufacture of lactic acid on a large scale, on lines laid down by my predecessor, Mr. Chas. E. Avery. While some of my facts are not new, considerable work having been done very recently on this subject, and while none of my investigations have been carried farther than the daily exigencies of manufacture required, yet I trust that from the exceptional opportunities that I have had, they may be found of interest.

The lactic acid industry dates back about twenty years, when Mr. Avery began his investigation, which resulted in the process which he covered from 1881 to 1885 by American and foreign patents. The production of lactic acid on a large scale by fermentation is interesting because it employs micro-organisms to split up the glucose molecule into two molecules of ethylidene lactic acid. The micro-organism that does this work is well known as the bacillus acidi lactici. This bacillus has been described variously—not from any inaccuracy of the observer, but because it is of great variety itself, a certain variety developing most rapidly in a certain medium. The bacillus which does the work in a highly nitrogenous saccharine solution is a large species. Its form is a double truncated cone, averaging in length 2 to 2½ millimetres, and about 1 millimetre in diameter. It has the tendency of all lactic bacteria to link itself together in pairs or short chains. The most abundant lactic bacteria in sour milk are only $\frac{8}{10}$ millimetre long, but a little thicker in proportion than those found in my saccharine solutions.

The manufacture of lactic acid has three divisions: The preparation of the saccharine solution, the fermentation, the conversion of the fermented liquor into commercial lactic acid. The source from which the saccharine solution is obtained is not important. The location of the factory determines the raw material that can furnish a glucose liquor most cheaply. The proportional composition of the saccharine solution is very important. For complete decomposition the saccharine solution should not vary between the limit

[1] *The Journal of the Society of Chemical Industry*, June 30, 1897.

1·05 to 1·075 sp gr.; for technical reasons the higher density is preferable. A solution of that density will contain from 7½ to 11 per cent. of saccharine matter. It is not essential to have all the saccharine matter in the form of grape sugar. In fact, it seems to be advantageous to have 10 to 15 per cent. of it as cane-sugar, which, becoming inverted in the process, furnishes fresh material, as it were, for the ferment. To do its work thoroughly, the lactic bacillus needs to be well nourished by nitrogenous matter. The most convenient form for this nitrogenous material is as it comes from vegetable life, as extracted, for instance, from bran by the action of boiling water and dilute acid. At different times I have used material obtained from animal and mineral sources. In the laboratory it is difficult to detect material differences. On the large scale, I prefer a vegetable source; there seems to be a complete utilization of the material. The amount of nitrogenous material should be at least 8 per cent. of the saccharine constituents. I assume by nitrogenous matter a body of substantially the composition of albumin, containing 15 to 20 per cent. of nitrogen in complex form. Perhaps it would be more accurate to say the total nitrogen should be nearly 2 per cent. of the saccharine material, and preferably combined with carbon. If a mineral food is to be employed, ammonia salts should be in larger proportion than nitrates. A low percentage of phosphates will suffice, and the presence of such potassium does not seem to be essential.

The requisite saccharine solution made up and boiled for at least an hour, to make sure of sterilization, is conveyed into the fermentation tank. There it is rapidly cooled to 55° C. or lower, not going below 45°, and impregnated. Impregnation takes place at a higher temperature than observers have generally stated, a peculiarity perhaps arising from the large scale at which the work is carried on. I may state here, in a general way, that the modified conditions caused by working the bacteria on a large scale give an opportunity for variation from laboratory results. A large body of fermentable liquor is less susceptible to foreign spores, more energetic in its development, and productive of more obvious results than a solution such as is usually found in the laboratory. Consequently I feel that the chemist, who is to investigate and utilize, to the fullest extent, nature's great oxidizing agent, the mycoderma aceti, and nature's great reducing agent, the bacillus butyrici, must be as

familiar with them in a 5,000-gallon vat as in the pure culture state in a test tube.

In continuous manufacture the ferment solutions are impregnated from a preceding ferment liquor, in which a lively fermentation is in progress. Decided advantage is obtained by using a generous amount of such liquor. Twenty per cent. is none too much. For an original impregnation, lactic bacteria must be obtained from an outside source. I prefer to use for that source milk that has been allowed to stand at a temperature of 45° until slightly sour. If the milk is allowed to sour too long, before using as an impregnating fluid, a tendency is shown for butyric bacilli to develop. This same objection is true if rotten cheese is used. Should the saccharine solution be allowed to ferment spontaneously, everything may happen or nothing. A good lactic fermentation may develop, a meagre alcoholic or a meagre viscous, a little butyric, or a little of each, and very much butyric, the last of which is most probable. The best original impregnation I ever had was obtained in the following manner: A pure culture of the lactic bacillus was obtained from the bacteria in a ferment tank and preserved. Previously sterilized milk was impregnated from this culture, and kept under pure culture conditions for a day, and then used with noticeable advantage over the spontaneously soured milk.

The impregnation accomplished in the saccharine solution, which should be neutral or faintly acid, not alkaline, the main process in the manufacture of lactic acid is begun. The success or failure in the manufacture depends wholly in the management of the fermentation. For economical production, over 90 per cent. of the glucose must be converted into lactic acid. Any unconverted glucose works a double injury, not only being a loss of material, but also making the resultant lactic acid liable to subsequent decompositions. In our factory to-day we have practically no residue of undecomposed glucose, and the yield of lactic acid is over 98 per cent. As I have said before, the impregnation takes place at 45° or above, and from that point the temperature is allowed to decrease somewhat as the fermentation solution grows older. If it is desirable, as it usually is, to have the fermentation proceed briskly, the temperature must be higher than when, as is occasionally the case, it is desired to have a slow fermentation. It should be borne in mind, however, that a lactic fermentation of itself gives out considerable heat—the more so if quick running.

As the fermentation progresses, the solution must be neutralized with milk of lime, or chalk in suspension. The limits of acidity in which lactic bacteria are healthy are rigidly confined between 0·02 and 0·5 of 1 per cent. Keeping the acidity of the fermentation between these limits is the main preventive against butyric fermentation, as the regulating of the temperature is the preventive against alcoholic fermentation. If the fermenting solution is over-neutralized, the butyric ferment will at once begin to act, and, once active, is very difficult to control. It is the greatest enemy to the lactic fermentation, destroying the lactic acid that has been made, and devouring new quantities as fast as they can be produced. In twenty-four hours one-third of the lactic acid may be destroyed by the butyric bacillus. Anti-ferments cannot be used with much safety in lactic fermentation. The lactic bacillus is more susceptible than other ferments, and is killed while others are only stagnated. Mustard-seed oil is about the only exception that I know. This has apparently a deadening effect on butyric fermentation, with no serious effect on the lactic fermentation. The lactic fermentation is best completed in from three to six days, although its life may be prolonged up to a fortnight. Any prolongation of life is attended with danger of butyric invasion. When the fermentation is ended, the liquor must be heated sharply to kill all bacteria and spores and prevent subsequent fermentation.

The fermented liquor, which is now a solution of calcium lactate, with a multitude of dead lactic bacteria floating in it, is filtered and evaporated. If a pure lactic acid is desired, the calcium lactate is allowed to crystallize and purified by repeated crystallization. For a commercial lactic acid, decomposition by sulphuric acid of the dense uncrystallized solution of calcium lactate gives an acid of sufficient purity. The free acid obtained from this decomposition is further concentrated to such strength as the market demands. In evaporating free lactic acid there is danger of forming lactic anhydride. It is possible to have conditions such that the longer evaporation takes place the less percentage of lactic acid is obtained. In concentrated solutions very little lactic acid is lost by volatilization. In dilute solutions much acid may be mechanically carried away with steam, especially if a blast is used. A 50 per cent. solution is about as concentrated as it is economical to manufacture. This appears on the market as a syrupy liquid, with more or less brown color,

and a specific gravity of 1·20, and contains about 7 per cent. of lactic anhydride.

The applications of lactic acid to-day, while limited, are increasing. The majority of all that is produced is used by the woollen dyer as an assistant in mordanting with bichromate of potassium. For this purpose I believe it has advantages which the technical world is beginning to appreciate. Without discussing at length the comparative merits of tartaric, oxalic and lactic acids, I will just mention the advantages which are claimed for lactic acid, namely, greater reducing power, greater solubility of itself and its salts, and less corrosive action. The first claimed advantage, the greater reducing power of lactic acid toward chromium salts and chromic acid, is generally admitted in comparison with oxalic acid, and also in the case of tartaric acid, although the fact that tartaric acid reduces chromium salts more quickly has led to some discussion. Admitted that lactic acid has the greater reducing power, the value of this property in the dye-bath is not yet absolute, as with many coloring matters I do not find that the best results are obtained with the chromium reduced to its lowest terms. Yet, if lactic acid does the most economical reducing, it is but a question of correct proportioning of the recipe to obtain the desired shade at the lowest cost. The second and third advantages—greater solubility and less corrosive action—are unquestioned. In corroboration of my estimate of the value of lactic acid in the woollen industry, the following statistics of lactic acid are submitted. In 1894 the dye-houses of the United States and Canada used about 400,000 pounds of lactic acid, while none was used in England or Europe. In 1895 there was a domestic consumption of 1,000,000 pounds, and a foreign consumption of 500,000 pounds; in 1896 the domestic consumption was 1,200,000 pounds, and the foreign 1,000,000 pounds.

Lactic acid is used to a very limited extent in the calico-printing industry. Some discharge effects can be obtained advantageously with it. In most instances, however, the hygroscopic nature of the acid is injurious in its effect on colors which have to be steamed.

Next to the woollen industry, the most important application for lactic acid is in the preparation of hides for tanning. The efficiency of the bran drench for removing the lime from the skin, and making it porous and in good condition for receiving the tannage, is due to the lactic acid produced by the fermentation of the bran. A dilute

solution of lactic acid will do this work as well, and is much easier to control in its action. The slightly higher cost is more than compensated for by the prevention of waste. To the researches of Mr. Wood and Mr. Andreasch (F. Andreasch, *Der Gerber*, 21, 506; 22, 513) this application is attributable. In America over 300,000 pounds of lactic acid have been consumed, mainly by a few tanneries, during the last six months.

In the household lactic acid is used medicinally, and it is a substitute for other acids and fruit juices in making acid beverages. The large possible application of lactic acid for domestic use—the replacing of cream of tartar by the acid lactate of calcium—has not yet been put in practical operation.

With regard to the analysis of lactic acid, I feel I can add little to what Allen has collected in the latest volume of his Organic Analysis (A. H. Allen, Commercial Organic Analysis, Vol. III, Part III, 411, *et seq.*). On account of the solubility of all its salts, the direct determination of lactic acid is a long and delicate process. Generally the indirect method—determining total acidity and percentage of foreign acids—gives more expeditious results. There is not much sophistication of lactic acid. Sometimes acetic and mineral acids are found in it, and now and then samples of so-called lactic acid containing no lactic acid at all. Usually, however, commercial lactic acid is pure, except from products incident to manufacture and not deleterious in effect. The strength varies from 20 to 50 per cent., according to the price and for what purpose the acid is intended to be used.

ON A SOLUBLE COMPOUND OF HYDRASTINE WITH MONOCALCIUM PHOSPHATE.[1]

By T. H. Norton and H. E. Newman.

The following experiments were made in connection with an endeavor to enlarge the number of soluble salts of hydrastine, especial interest attaching to the combination of the alkaloid with a mineral salt of recognized value in medicine.

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[1] *Journal of the American Chemical Society*, October, 1897.

As is well known, but few salts of hydrastine are readily soluble in water. In our work we made use of monocalcium phosphate, which was carefully purified by prolonged washing with alcohol. A saturated solution of the salt in cold water was prepared by thorough trituration, the phosphate being in excess. On triturating this saturated solution with a large excess of pure hydrastine, a certain amount of the latter would enter into solution, time, as was eventually found, being an important factor. In order to ascertain the nature of the product obtained, the filtered solution was evaporated either by heat or spontaneously, or in a vacuum. In no case was it possible to detect any trace of crystallization. The solution invariably became syrupy, and finally left an amorphous residue quite similar to rosin in its appearance. This residue was soluble in about 10 parts of cold water. A small amount of boiling water would change it into a syrup. Both boiling and cold alcohol dissolved it easily and in about the same proportions. The melting point was 126°–128°. Although there was no criterion of the purity of the substance, it was submitted to analysis. No success followed an attempt to determine the amount of hydrastine present by the use of potassium permanganate, as no definite end reaction could be obtained. Resort was then had to incineration, care being taken to avoid unnecessarily high temperatures in the use of platinum dishes for the purpose. The substance dried *in vacuo* was heated to 105°. The very divergent results obtained showed that there was no fixed percentage of water held by the compound after desiccation *in vacuo*. The product of incineration was white, vitreous calcium metaphosphate.[2]

It was in all cases calculated to monocalcium orthophosphate, and the difference was assumed to be hydrastine. Analytical results soon showed that prolonged trituration was necessary to increase the amount of the alkaloid taken into combination by the phosphate. From $\frac{3}{0}$ to $\frac{1}{2}$ gramme was used in each analysis of the substance dried at 105°. The following analytical data were obtained:

No.	Time of Trituration.	Monocalcium Phosphate. Per cent.	Hydrastine. Per cent.
1	10 minutes	44·69	55·31
2	15 "	38·33	61·67
3	5 "	55·70	44·30

[2] Birnbaum: *Jsb. d. Chem.*, 1871, 281.

No.	Time of Trituration.	Monocalcium Phosphate. Per cent.	Hydrastine. Per cent.
4	3 minutes	57·73	42·27
5	80 hours[3]	29·00	71·00
6	80 "	28·03	71·97
7	40 "	31·00	69·00
8	50 "	30·43	69·67
9	50 "	28·10	71·90
10	6 weeks	28·95	71·05

[3] In experiments 5 to 10 the alkaloid and the solution were placed in a corked bottle, and this was introduced into a box provided with paddles and suspended on an axis, which was kept in constant agitation beneath a water tap.

In order to appreciate these figures, let us note the theoretical percentages of the simpler possible combinations of monocalcium phosphate and hydrastine.

A. $2Ca(H_2PO_4)_2 . C_{21}H_{21}NO_6$.
$Ca(H_2PO_4)_2 = 54{\cdot}10$ per cent.
$C_{21}H_{21}NO_6 = 45{\cdot}90$ per cent.

B. $Ca(H_2PO_4)_2 . C_{21}H_{21}NO_6$.
$Ca(H_2PO_4)_2 = 37{\cdot}9$ per cent.
$C_{21}H_{21}NO_6 = 62{\cdot}1$ per cent.

C. $2Ca(H_2PO_4)_2 . 3C_{21}H_{21}NO_6$.
$Ca(H_2PO_4)_2 = 28{\cdot}9$ per cent.
$C_{21}H_{21}NO_6 = 71{\cdot}1$ per cent.

It will be seen at once that the apparent limit of the amount of hydrastine which can enter into combination with the phosphate, as shown by analyses 5 to 10, is practically identical with the percentage of the alkaloid present in the hypothetical salt C, where two molecules of monocalcium phosphate are in combination with three molecules of the alkaloid. In the picrate of hydrastine, one of the few crystalline derivatives, we encounter a combination of equal molecules $[C_6H_2(NO_2)_3OH . C_{21}H_{21}NO_6]$; the amorphous sulphate and chloride ($C_{21}H_{21}NO_6 . H_2SO_4$) correspond, however, to the formula B. While the formula C is unsupported by analogy and the aid of crystallization is lacking, the analytical data point strongly towards this as the correct expression for the product obtained by the method described.

RECENT LITERATURE RELATING TO PHARMACY.

THE PREPARATION OF HIGHLY PHOSPHORESCENT STRONTIUM SULPHIDE.

According to J. R. Mourelo (*Compt. Rend.*, **124**, 1024), the most satisfactory phosphorescent strontium sulphide is prepared as follows:

An intimate mixture of 285 grammes commercial strontium carbonate, 62 grammes flowers of sulphur, 4 grammes crystallized sodium carbonate, 2·5 grammes sodium chloride and 0·4 gramme bismuth subnitrate is placed in a crucible, covered with a layer of coarsely powdered starch, then submitted for five hours to a bright red heat and allowed to cool very slowly during ten or twelve hours. A white, friable mass is thus obtained, which develops a fine greenish-blue phosphorescence when exposed for about one second to daylight, and so intense as to be plainly visible in a shaded situation. The mixture becomes inert when powdered, but may usually be restored by re-ignition with starch.

PARAFORMIC ALDEHYDE AS AN ANTISEPTIC.

Dr. B. H. Paul and A. J. Cownely (*Pharmaceutical Journal*, August 7, 1897), have conceived the idea that paraformaldehyde, which is a solid substance, volatilizable at about 100°, might be used as a more compact antiseptic than formaldehyde, since, by boiling with water, the para modification is converted into formaldehyde.

Since the latter in 40 per cent. solution is the only form that is possible commercially, there would be a considerable saving in transportation, both in volume and by using the para modification.

For comparative experiments the authors boiled the solid modification with water in the proportion of four to ten, connecting the flask to an inverted condenser. The conversion was effected in about two hours, as was also the case when the operation was conducted in a sealed tube. In both cases clear solutions were obtained with only traces of acidity. The products were assayed by the ammonium hydrate method and found satisfactory. The conclusions are that it is readily possible to convert the insoluble paraformaldehyde into its soluble modification, formaldehyde, and that it would seem to be more advantageous to produce paraformaldehyde than formaldehyde for commercial use, as the former is more readily manipulated and is easily rendered soluble to a suitable degree of

strength for antiseptic purposes when required. Indeed, where an antiseptic powder is required there is no reason why paraformaldehyde itself should not be of great service.

On exposure to air of an aqueous solution of formic aldehyde until it dries up, there appears to be formed not the true para compound but a mixture partaking to some extent of the characters of the substance $(CH_2O)_2$, described by Tollens and Mayer as being formed when formic aldehyde is evaporated over sulphuric acid. This substance was found to melt at about 131° C., and was more soluble in water than paraformaldehyde. The polymer produced by adding sulphuric acid to formic aldehyde had a much higher melting point, namely, 170° C. The variation of the melting point from 152° to 172° C., ascribed to paraformaldehyde is no doubt due to an admixture of these two bodies.

SYNTHESIS OF CANE SUGAR.

L. Marchlewski (Rocznik Akad. Umiej. Krakowskiej., 1896) has obtained cane sugar by the action of acetochlorhydrose upon the potassium salt of *d*-fructose. The reaction is expressed by the following equation:

$$\begin{array}{l} CH_2.OCOCH_3 \quad CO_2.OH \\ | \qquad\qquad\quad | \\ (CH.OCOCH_3)_3\ (CH.OH)_3 + 4C_2H_5OH = 4CH_3COOC_2H_5 + \\ \qquad\qquad\qquad\qquad\qquad\quad KCl + C_{12}H_{22}O_{11}. \\ | \qquad\qquad\quad | \\ CH \qquad + \quad COK \\ O \qquad\quad O \\ \backslash CH - Cl \quad \backslash \end{array}$$

Pure acetochlorhydrose is dissolved in alcohol, and to the solution freshly prepared potassium levulosate is added. The mixture is left to stand for about seven days at ordinary temperature; to complete the reaction it is heated for half an hour on a water bath; next, the potassium chloride formed is filtered off, the filtrate evaporated at 80° C., and the residue dissolved in boiling water. The solution obtained is next treated with a solution of calcium hydrate, and the gradually formed precipitate filtered off, stirred in some water, and decomposed with CO_2. The calcium carbonate is filtered off, and the filtrate purified by calcium hydrate in a similar manner. Finally,

the aqueous solution of the sugar is extracted with ether in order to remove the saccharin, and then evaporated *in vacuo*. After some days' standing the cane sugar formed, crystallizing in the well-known forms. All the reactions and physical properties agree with those of natural cane sugar.—*Jour. Soc. Chem. Industry*, July 31, 1897.

RARE METALS IN NORTH CAROLINA.

In a recent circular of a North Carolina mining company, the claim is made that the future supply of some of the rare metals will come from that State.

Monazite yields 14 to 17 per cent. of cerium oxide, the metal being worth $2,880 a pound troy. There are in commerce no less than twenty-two preparations of cerium, of which the oxalate and nitrate are the most important medicinally.

Gummite, found in mica deposits, yields 50 per cent. uranium. The fused metal is worth 13½ cents a grain, or $768 a pound.

Lithrophilite and *amblygonite* contain from 9 to 10 per cent. lithium oxide. The demand for this metal has largely increased of late years, owing to the large consumption of lithia tablets.

SURGICAL ANTISEPTICS AND DRESSINGS.

Antiseptic Crayons.—L. Adrian (*Nouveaux Remèdes*, **13**, 483) has proposed a number of formulas for surgical antiseptics. The following is a typical formula for an antiseptic crayon:

Corrosive sublimate	0.500 gramme
Powdered talc	25.000 "
Gum tragacanth	1.500 "
Distilled water, Glycerin	āā q. s.

For 10 crayons.

In place of the corrosive sublimate a number of medicinal substances may be used as antiseptics, as boric acid, iodoform, phenol, salol, iodol, ichthyol, etc. Astringent and antiseptic crayons are prepared by using tannin, alum, antipyrine, ergotine or ferric chloride. Resolvent crayons are made with potassium iodide, and sedative crayons with belladonna, morphine, cocaine, etc.

Starch, dextrin or sugar may be employed to replace part of the tragacanth.

Laminaires antiseptiques.—The dried pieces of the stems of Laminaria digitata are employed in place of sponge tents. The laminaria

are solid, black in color, and the size of a goose-quill, and on coming in contact with the liquids of the economy, evenly swell to six times their volume. Before introduction into the cavity the surface is roughened by a grater or file, and they are then plunged for some minutes in tepid water. They may be preserved in one of the following solutions:

a.	Corrosive sublimate	1 part.
	Absolute alcohol	100 parts.
b.	Corrosive sublimate	1 part.
	Ether	100 parts.
c.	Iodoform	10 parts.
	Ether	100 parts.

Antiseptic powders are made with an inert base, and such substances as sulphocarbolate of zinc, iodoform, phenol, corrosive sublimate, salol, etc.

The following is the formula of the powder of Lucas Championniere.

	Grammes.
Iodoform, finely powdered }	
Benzoin " " } ā ā	930
Quinine " "	960
Magnesium carbonate, finely powdered	930
Oil of eucalyptus	120

This powder has a great reputation for indolent ulcers, and particularly with sores of the sacrum.

Kümmel has recommended common sand as a basis for antiseptic powders. White sand is sieved and heated to redness, whereby it is thoroughly sterilized; it is then incorporated with corrosive sublimate, phenol, iodoform, etc., in the proportion of 5 to 10 per cent.

Cloves and Caffeine in France.—At the last meeting of the Paris Syndical Chamber of Chemical Products, M. Adrian mentioned that the excise authorities had given distillers facilities for preparing oil of cloves, which were formerly not permitted. The cloves are admitted duty free, and, after having been used for preparing the oil, are burnt in the presence of an excise officer. M. Adrian thinks the same favor might be accorded to chemists for the preparation of certain alkaloids, and he especially referred to caffeine as being one of the most important on account of its increased use.—*The Chemist and Druggist*, October 9, 1897.

EDITORIAL.

The following circular letter has been received from the Department of Agriculture:

UNITED STATES DEPARTMENT OF AGRICULTURE,

DIVISION OF CHEMISTRY.

WASHINGTON, D. C., September 17, 1897.

DEAR SIR:—Under authority of Congress, the Department of Agriculture is investigating the extent and character of food and drug adulterations, and is desirous of securing all the information possible on the subject. Having been appointed special agent to inquire into and report upon this matter, the undersigned writes to request that you kindly furnish the Department all the information you have in regard to adulterations, together with any suggestions as to the best remedy for the evil.

(1) Do you know of any new adulterant? If yes, state what, and how used; (2) Would a national food and drug law assist in preventing adulteration? (3) Would uniform food, drug and pharmaceutical laws tend to promote efficiency and purity? (4) Please suggest what would best promote the interests of consumers and legitimate manufacturers and dealers; (5) What is your opinion as to the extent of damage done legitimate business by imitation of brands, packages, etc.? (6) To what extent do sophistication, misbranding and injurious adulteration exist? (7) Have State laws aided in preventing adulteration? To what extent? (8) Would a national law assist State officials in properly executing the local laws? (9) Have adulteration, sophistication and misbranding increased or decreased? Prompt replies to the above, together with any other information or suggestions, will be highly appreciated.

Yours respectfully,

A. J. WEDDERBURN,
Special Agent.

Approved:
JAMES WILSON,
Secretary.

We confess to an inability to answer some of these questions. An affirmative reply to 2 and 3 and a correct solution of 4 would leave nothing in the way of worldly success and happiness, but the indifference of Congress and the neglect of that body to pass the necessary laws. No. 7 we would respectfully refer to the people of the State of Ohio.

We predict that answers to *all* the queries in the letter will come in slowly, but it is possible that they may lead to the compilation of a new set of questions not quite so comprehensive. Certainly the Department of Agriculture can do no better work than collect information on the extent and character of food and drug adulteration, and individuals may feel that they are doing a public service in writing to the special agent, answering the questions, as far as possible, and in making suggestions as he requests.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

MISSOURI BOTANICAL GARDEN. EIGHTH ANNUAL REPORT. William Trelease, Director. St. Louis, Mo. 1897. Pp. 236.

The Report for the year 1896 contains: Report of the Officers of the Board; Eighth Annual Report of the Director; Scientific Papers; Library Contributions. The report of the Director is always interesting, but this year it is made additionally so by short accounts of the disastrous storms which visited the Gardens on May 21st and 27th; the former being especially destructive on account of the accompanying hail, and the latter being cyclonic in character. "While the grounds were not traversed by the cyclonic funnel, but were exposed only to the strong northwest gale which accompanied it, the violence of the wind was such that a number of the structures on the grounds were either unroofed or totally wrecked, while some 450 trees, many of them of large size, were wholly or practically destroyed, and a large percentage of those left standing were seriously broken. A more graphic view of the destruction of the trees may be obtained from the statement that 186 cords of firewood have been prepared from the more workable trunks and larger branches of the trees removed." It was found necessary to expend over $4,000 in such storm repairs as could be made, and the loss in specimen plants cannot be expressed in money.

The herbarium, during the period of time covered by this report, has increased from 159,046 unmounted specimens to 258,629 mounted specimens, protected by impregnation with corrosive sublimate.

The scientific papers, which occupy the bulk of the volume are: "The Mosses of the Azores," by J. Cordot; "On Some Mosses Collected in Madeira," by William Trelease; "Botanical Observations on the Azores," by William Trelease. The last is very interesting, includes a catalogue of the plants occurring in the Azores, and is illustrated by fifty-five full-page plates. The other portions of the book are beautifully illustrated.

PROCEEDINGS OF THE NINETEENTH ANNUAL MEETING OF THE MISSOURI PHARMACEUTICAL ASSOCIATION, June 8-12, 1897.

This is one of the first reports of this year's State meetings to reach us. It contains a number of good original papers, among them one by G.H. Charles Klie, on "A So-called Tasteless Quinine." He has done considerable work in exposing the fraud of the substitution of calcium sulphate for quinine sulphate, under the name of "Flora-China." This substance was first shown at the Montreal meeting of the American Pharmaceutical Association in 1896; but notwithstanding the publicity given to it there, it has continued to flourish in the Southern States. Mr. Klie traced its origin to Hankins Mook Company, Live Oak, Fla.

ANNUAL REPORT OF THE CLERK OF FORESTRY FOR THE PROVINCE OF ONTARIO, 1897. Thomas Southworth, Clerk.

The following are the chief subjects discussed in this interesting volume: "The Crown Lands Forestry Problem;" "Forestry on the Farm;" "Nature Study in the School;" "Entomology;" "The Manufacture of Wood Charcoal."

REPORT OF THE BOARD OF MANAGERS OF THE PENNSYLVANIA HOSPITAL TO THE CONTRIBUTORS. Philadelphia, 1897.

The report of a charity which has existed and flourished for a century and a half is a matter that should attract attention, and a careful perusal of it will convince one that this time-honored institution is one to be proud of. The volume is elaborately illustrated with interior and exterior views of the buildings.

EARLY AMERICAN CHEMICAL SOCIETIES. By H. Carrington Bolton, Ph.D. Reprint from the *Journal of the American Chemical Society*, August, 1897.

The author makes out a very interesting historical account of the early efforts of chemists to associate for mutual benefit. The Chemical Society of London, the oldest in Europe, was founded in 1841, forty-nine years after the first American society. The early American societies are summarized as follows:

I. The Chemical Society of Philadelphia, founded in 1792.

II. The Columbian Chemical Society of Philadelphia, founded in 1811.

III. The Delaware Chemical and Geological Society, founded in 1821.

The account of the active workers in these societies constitutes the main body of the paper.

UEBER FLECHTENSTOFFE, von O. Hesse. Reprint from *Berichte der Deutschen Chemischen Gesellschaft*, 30, 1893.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, October 19, 1897.

The first of the series of pharmaceutical meetings for 1897-98 was held in the College Museum, with J. W. England in the chair. The reading of the minutes of the last regular meeting was omitted and they were allowed to stand as published.

The chairman then called for the presentation of specimens. Dr. C. B. Lowe showed some extraordinarily fine samples of asafetida which he had procured from the Smith, Kline & French Company, of this city, they having received it in original packages from Bombay, through London. He also showed some samples of Japanese persimmons from Florida, where they are grown to a considerable extent by grafting the wild variety. Prof. Trimble presented, on behalf of Mr. Charles Bullock, quite a collection of minerals and ores for the cabinet of the College. The chairman showed a colchicum plant which had been placed in alcohol while in bloom and which also was intended for the cabinet. Prof. Trimble moved that a vote of thanks be extended Mr. Bullock for his valuable donation, and it was so ordered.

The reading and discussion of papers next occupied the attention of the meeting, and the first one presented was on "An Examination of Some Official Lead Preparations," by F. W. Haussmann.

This paper gave evidence of much careful and thoughtful work on the part of the author, and the criticisms and suggestions contained therein were of an

eminently practical and useful kind. The chairman spoke in complimentary terms of the paper, and said that suggestions whereby rapid methods could be adopted were of great value to the pharmacist.

Prof. Remington said that detailed methods, such as Mr. Haussmann described, were very valuable to the Committee on Revision of the Pharmacopœia, and that he had done pharmacy a distinct service by this work.

"International Congresses" was the subject of a paper by Prof. J. P. Remington. The author took a comprehensive view of the question of international gatherings, and while he portrayed the ideal congress, he did not lose sight of the real difficulties which attend all such undertakings. He believed in considering conditions as they actually exist, and that by so doing, many of the hindrances which retard the successful issue of international scientific gatherings could be eliminated.

A paper entitled "Balsam Copaiba, Oil of Copaiba, Mass Copaiba, Resin Copaiba and Gurjun Balsam" was presented by Lyman F. Kebler.

This paper embodied the results of an examination of a number of samples of the above substances. The author said that on account of the number of varieties of copaiba and the unknown composition of them, their qualitative analysis was attended with difficulty. The data presented by him was therefore intended to supply this deficiency.

In discussing the active constituents of copaiba, Dr. Lowe said that there seemed to be some misapprehension among physicians as to the particular effect of each of these. He said that the volatile oil has a stimulating action, while the acid resin is a diuretic.

The last paper on the programme was presented by the chairman, J. W. England, and was on the question, "Shall Distilled and Fermented Liquors be Dismissed from the U. S. Pharmacopœia?"

Notwithstanding the interpretation placed by many upon the attitude of the Government on the subject of alcoholic liquids, the author believed that the above question had no bearing upon the saloon question. He looked upon these liquids as drugs, and urged retaining them in the Pharmacopœia and demanding them of a certain quality.

His remarks occasioned considerable applause, and the subject was freely discussed by the members present.

Wm. B. Thompson was in favor of dismissing whiskey from the Pharmacopœia since it entered into no official preparation. He furthermore believed that the official wines would serve their purpose as well if made with alcohol of the required strength.

Dr. Lowe was of the opinion that alcohol was the only therapeutic constituent of these liquids, but that the bouquet made them more palatable, which was an argument for retaining them.

C. Carroll Meyer, referring to the sale of liquor in stores, believed that druggists were honorable in this respect, and that very few of them sold it, except in Prohibition States, without the physician's order.

Mr. Kebler took the negative side of this question, and said that he had examined samples of wine and found many which were adulterated and others which were artificial products colored with aniline dyes. He believed that many victims of the alcohol habit were attracted by the so-called bouquet who might not otherwise have persisted in the habit.

MINUTES OF MEETING OF MEMBERS OF THE COLLEGE.

The stated quarterly meeting of the members of the College was held September 27th, at 4 o'clock P.M., Vice-president Jenks presiding. Minute of previous stated meeting read and adopted. Minutes of meetings of the Board of Trustees for July and September presented and approved. The secretary referred to the subject of a proposed uniform pharmacy law for the States, concerning which this College was requested to send a form or draft to the Chairman of the Section on Education and Legislation of the American Pharmaceutical Association. The consideration of the subject having been postponed for the want of sufficient time, it was again resolved to defer action until some more definite progress or report should be made by the Committee of the Association. In obedience to the direction given the secretary, there was presented and read the opinion of the legal counsellors of the College, upon the purpose contained in the interrogatories submitted by Mr. Boring at the June meeting. These questions involved the constitutionality of certain proposed by-laws which were contemplated as an amendment to the existing code. On motion, it was resolved to receive and file this report. Mr. Boring objected to this method of disposing of the subject of this report, and desired that the matter should be discussed at the present meeting. Whereupon Mr. Beringer moved, and the motion was carried, that the chairman should appoint a committee of five members who should consider the propositions, and report upon the same at the next stated meeting. The chairman named Messrs. Beringer, Boring, Stedem, Weidemann and Cliffe as members of this committee. Prof. Sadtler reported, verbally, at length, on behalf of the delegates of the college to the sessions of the American Pharmaceutical Association upon the proceedings of that body at the recent meeting in August. The terms of Messrs. Krewson, Weidemann and Kline, as trustees, expiring with this date, and these gentlemen being re-nominated without opposition, the secretary was instructed to cast an affirmative ballot, which, being done, all were declared to be elected. The decease of Prof. Bastin creating a vacancy in the Board of Trustees, nominations for this position were called for. Upon the nominations being made, and the votes of candidates recorded, the tellers announced that Mr. C. Carroll Meyer had received the highest number and was therefore duly elected.

The meeting, on motion, adjourned.

WILLIAM B. THOMPSON, *Secretary.*

NOTES AND NEWS.

Tribuna Farmacéutica is the name of a new pharmaceutical journal in Buenos Ayres. It is the organ of the *Circulo Farmaceutico Argentino.* The publishing committee consists of José Bonauni, Dr. Estanislao Zubieta, Victor B. Molina, Bernardo Nespral and Lino Viñas Loureiro.

The first two numbers of eight pages each are made up partly of matters relating to members and of professional interest, and contain original articles on the estimation of tannin, on some incompatibilities and on the rapid and economic preparation of hydrogen peroxide.

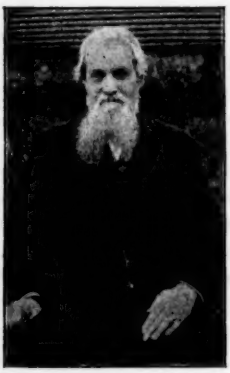
This new journal bids fair to publish considerable original matter.

The Cinnamomums of New South Wales.—A paper was read at the July meeting of the Linnean Society by R. T. Baker, assistant curator Technical Museum, on the Cinnamomums of New South Wales, with a special research on the oil of C. Oliveri, Bailey.

The genus Cinnamomum, hitherto unrecorded for New South Wales, is now shown to occur over a large area of the coastal district, being represented by two species, C. Oliveri, Bailey, C. virens, sp. nov. The former species has in the past been mistaken in the northern colony for Beilshmiedia obtusifolia, and has only recently been identified as a Cinnamomum; very probably the same confusion of species has occurred in this colony. C. virens appears to stand somewhat alone, its affinities with known species not being very marked. Descriptions of the timber, gall-fungus, bark and oil are given. The oil obtained from C. Oliveri is highly aromatic, and is found to contain cinnamic aldehyde, eugenol, together with other constituents. The bark gave nearly one per cent of oil. It is hoped that a new commercial product may result from these investigations.—*The Pharmaceutical Journal of Australasia*, August 28, 1897.

OBITUARY.

Athanase Roidot, who for forty-nine years conducted a drug store in the vicinity of Eighth and Vine Streets, this city, died on October 9th, at his residence, 905 Buttonwood Street. He was born nearly eighty years ago, in France, and came to this country at an early age.



He learned the drug business in his native country, and when he came to this city he entered the employ of Elias Durand, who at that time had a store at the northwest corner of Sixth and Chestnut Streets. Mr. Roidot was elected a member of the Philadelphia College of Pharmacy in 1852.

Peter Lund Simmonds, whose portrait we present with this sketch, died in the Charterhouse, London, October 3d, in the eighty-third year of his age.

The deceased was formerly well known as a writer on applied science and as having taken an active part in the management of several of the large international exhibitions. He was born at Aarhuus, Denmark, in 1814, but spent most of his life in England. He was an extensive writer on agricultural and food topics and commercial matters in general, including the subject of drugs, and was not an infrequent contributor to this JOURNAL. He was proprietor and editor of the *Technologist*, 1862-66, and the *Journal of Applied Science*, 1870-81. Of his other published works the following may be mentioned: "The Commercial Products of the Vegetable Kingdom," "Waste Products and Undeveloped Substances," "Waste Products, A New and Enlarged Edition," "Tropical Agriculture, New and Enlarged Edition," and "A Hand-book of British Commerce."

Mr. Simmonds had, at different times during his life, been elected to membership in various literary and technical societies, including several representative agricultural societies and the Society of Arts, London, and in 1896 was elected an honorary member of the Philadelphia College of Pharmacy.

QUERCUS PHELLOS, L.—WILLOW OAK.